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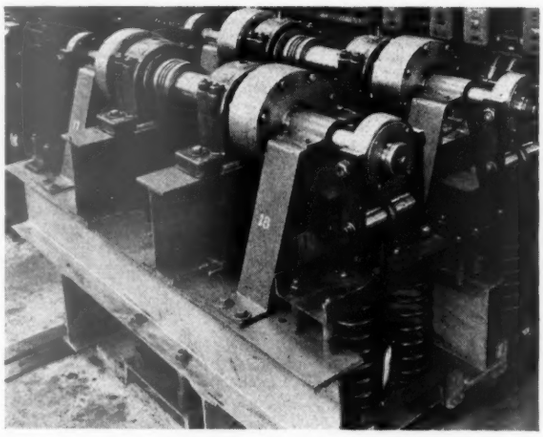

Fatigue Testing Machine for One-Quarter Scale Size Axles Used in A. A. R. Passenger-Car Axle Tests

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July, 1938

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STRETCHING STARTS TROUBLE

REPUBLIC STEEL
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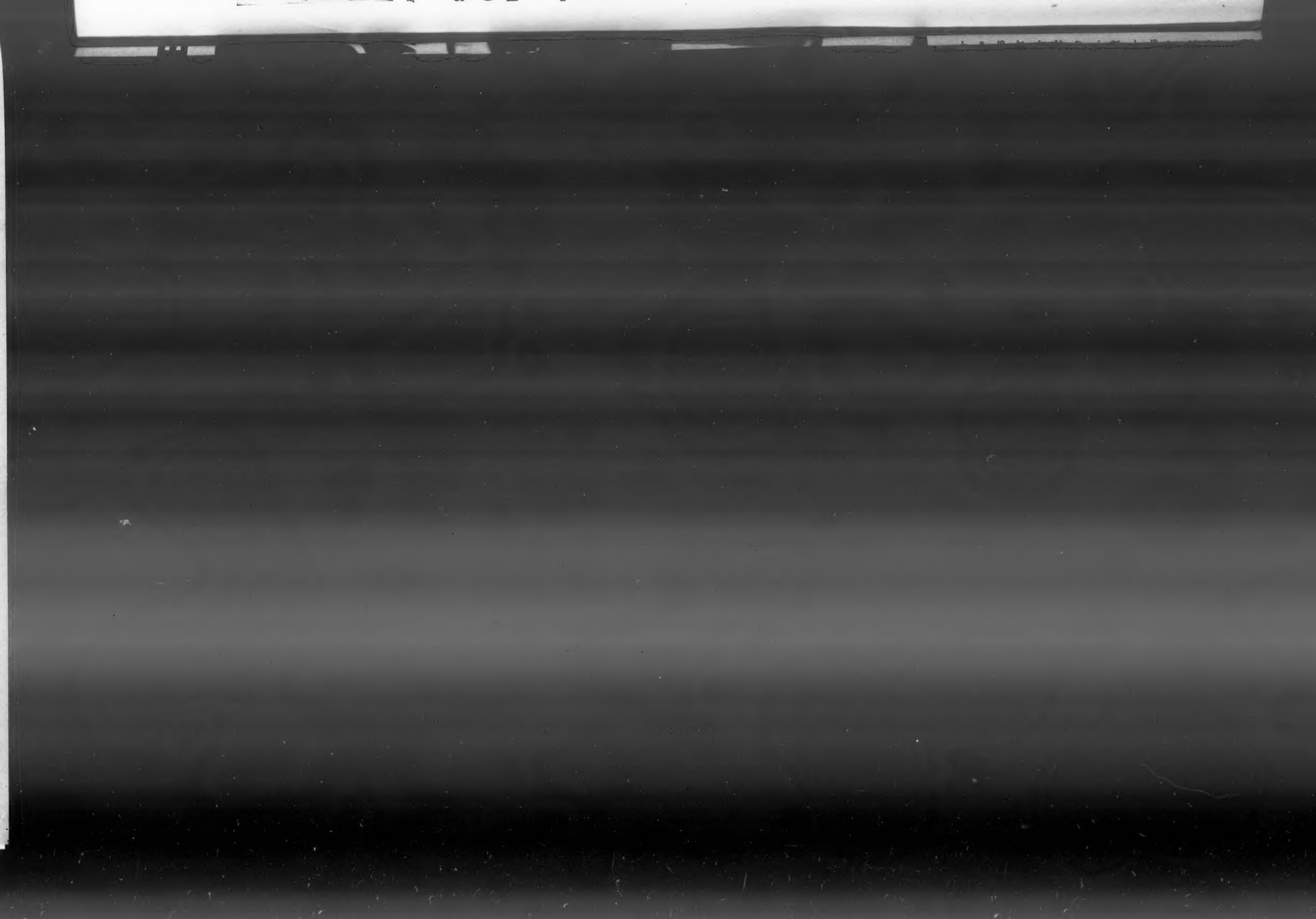
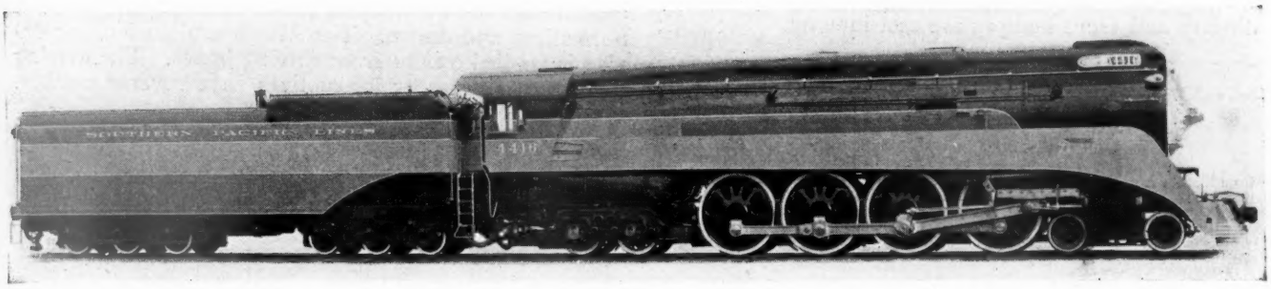




High-speed heavy passenger locomotive built by Lima for the Southern Pacific

Southern Pacific Receives Second Lot of

Streamline 4-8-4 Locomotives

Fourteen locomotives designed for fast passenger-train service were built by Lima—Each locomotive develops a total tractive force of 75,000 lb.

THE Lima Locomotive Works, Inc., recently delivered to the Southern Pacific fourteen 4-8-4 high-capacity streamline passenger locomotives which are similar in general design and streamlining to six 4-8-4 locomotives* built early last year specifically for handling the Daylight train service inaugurated about a year ago between San Francisco and Los Angeles. However, the new locomotives, with 80-in. driving wheels and developing a total maximum tractive force of 75,000 lb. are somewhat greater in capacity and designed for higher speeds than the first six built, which have 73½-in. driving wheels and develop a total tractive force of 74,710 lb.

The principal differences in the two lots of locomotives lie in the greater length of the wheel base and boiler of the later locomotives. The increased boiler pressure and the changes in the diameter and stroke of the cylinders. There have also been some changes in details, notably in the lightening of the reciprocating parts and in the boiler material.

The later locomotives have a driving-wheel base of 21 ft. 6 in. and a total engine wheel base of 47 ft. 8 in. The driving-wheel base of the first locomotives is 18 in. shorter and the total engine wheel base 22 in. shorter. The weight on the drivers has been increased only about 800 lb. The total weight of the locomotive, however, is 11,600 lb. greater. The boiler pressure of the later locomotive was increased 30 lb. to 280 lb. per sq. in. and the cylinders have been decreased 1 in. in diameter to 26 in., but increased in stroke from 30 to 32 in. Thus, the locomotives develop a cylinder tractive force of 62,800 lb., an increase of 600 lb. over the earlier lot.

The Boiler

The boiler of the later locomotive is practically identical in dimensions with that of the earlier lot, with the exception of an increase of 20 in. in the length of the combustion chamber. The barrel of the boiler is in three courses, the middle one being conical in form. The dome is mounted on this course. The boiler shell and roof sheet are of nickel steel, whereas basic openhearth steel was used in the construction of the earlier lot. This affords an interesting comparison of the effect of the two materials on the weight of the locomotives. The nickel-steel in the later boiler, designed to carry a working pressure of 280 lb., is ⅞ in. thick in the first ring, $^{15}/_{16}$ in. thick in the conical ring, and $^{31}/_{32}$ in. thick in the third ring. The carbon steel in the earlier locomotives, designed for a working pressure of 250 lb. per sq. in., is $^{1}/_{16}$ in. more in thickness in the first and second rings and $^{3}/_{32}$ in. more in thickness in the third ring, the outside diameters of the first and third rings, respectively, being identical in the two boilers.

The firebox is fitted for oil burning and includes a combustion chamber which extends 80 in. into the barrel of the boiler. Welding was used extensively in the firebox construction. The crown sheet is butt welded to the side sheets and combustion chamber and the throat connection is butt welded to the crown, sides and combustion chamber. The door flanges in the back head and inside door sheet are also butt welded. Both the inside door sheet and the tube sheet are riveted in place. Seal welding has been employed on calking edges at a number of points in the firebox and at the mud-ring corners.

There is a complete installation of Flannery flexible staybolts around the combustion chamber, except for the long radial stays over the top. Flexible stays are also installed along the top of the sides and diagonally across the front and back top corners of the firebox in the breaking zone; also, there is a complete installation of flexible stays in the throat, and in breaking zone in the back head.

The boiler is equipped with a Type E superheater and

* Described in the March, 1937, issue of the *Railway Mechanical Engineer*, page 102.

Tangential dryer. The feedwater heater is the Worthington No. 5SA.

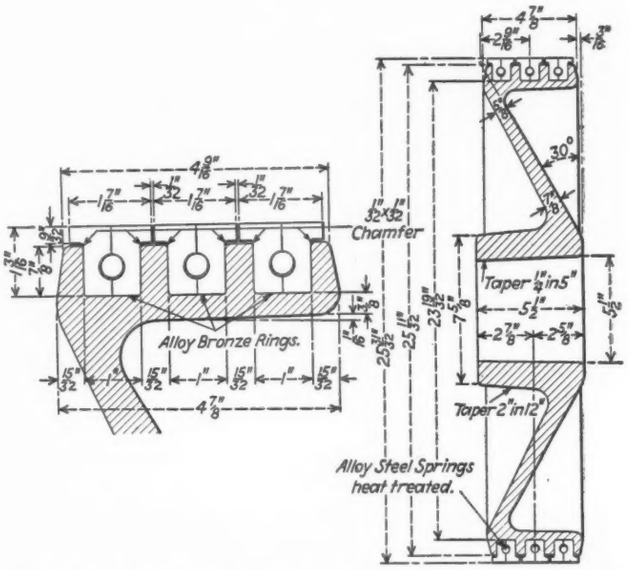
Foundation and Running Gear

Like their predecessors, the foundation of these locomotives is the General Steel Castings bed with which the cylinders and front bumper are cast integral. The back cylinder heads, however, are separate castings. Both trucks, also of General Steel Castings Company design, are fitted with oil-packed journal boxes. Owing to an increase of almost 6,000 lb. in weight carried by the engine truck, the journals have been increased from 7 in. by 14 in. on the earlier order to 7½ in. by 14 in. No changes were required in the trailer truck.

The driving axles are all fitted with grease-packed cellars and the wheels are of the Boxpok type. All of the axles under the locomotives are of medium carbon steel, normalized and drawn. The Alco lateral cushioning device is applied on the front driving boxes. The driving springs of the newer locomotives have reverse camber.

General Dimensions, Weights and Proportions of Two Lots of Southern Pacific 4-8-4 Type Locomotives

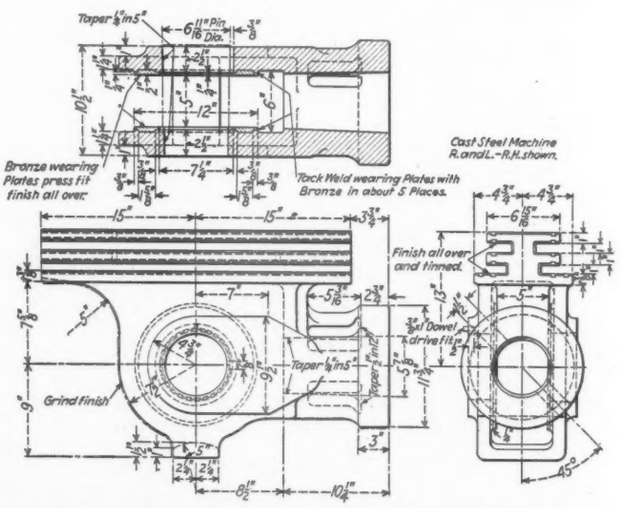
	Built early in 1937	Built late in 1937
Railroad	Sou. Pac.	Sou. Pac.
Builder	Lima	Lima
Type of locomotive	4-8-4	4-8-4
Road class	S448	S460
Road numbers	4410	4416–4429
Service	Pass.	Pass.
Dimensions:		
Height to top of stack, ft.-in.	16–4	16–4
Height to center of boiler, ft.-in.	10–8	10–8
Width overall (includ. streamline), in.	10–10	10–10
Cylinder centers, in.	93	94
Weights in working order, lb.:		
On drivers	266,500	267,300
On front truck	77,400	83,300
On trailing truck, front	46,300	49,500
On trailing truck, rear	58,200	59,900
Total engine	448,400	460,000
Tender	372,880	372,880
Wheel bases, ft.-in.:		
Driving	20–0	21–6
Rigid	13–0	14–0
Engine, total	45–10	47–8
Engine and tender, total	94–½	95–10½
Wheels, diameter outside tires, in.:		
Driving	73½	80
Front truck	36	36
Trailing truck	45½	45½
Engine:		
Cylinders, number, diameter and stroke, in.	27 x 30	26 x 32
Valve gear, type	Walschaert	Walschaert
Valves, piston type, size, in.	12	12
Maximum travel, in.	7½	7½
Steam lap, in.	1¾	1¾
Exhaust clearance, in.	3/8	3/8
Lead, in.	1/4	1/4
Cutoff in full gear, per cent	73½	73½
Boiler:		
Type	Conical conn.	Conical conn.
Steam pressure, lb. per sq. in.	250	280
Diameter, first ring, outside, in.	86	86
Diameter, largest, outside, in.	96	96
Firebox, length, in.	127⅛	127⅛
Firebox, width, in.	102¼	102¼
Combustion chamber length, in.	60	80
Tubes, number and diameter, in.	49–2¼	49–2¼
Flues, number and diameter, in.	198–3½	198–3½
Length over tube sheets, ft.-in.	21–6	21–6
Fuel	Oil	Oil
Grate area, sq. ft.	90.4	90.4
Heating surfaces, sq. ft.:		
Firebox and comb. chamber	350	385
Tubes and flues	4,502	4,502
Evaporative, total	4,852	4,887
Superheating	2,086	2,086
Combined evap. and superheat	6,938	6,973
Tender:		
Style	Rectangular water bottom	Rectangular water bottom
Water capacity, gal.	22,000	22,000
Fuel capacity, gal.	6,010	6,010
Trucks	6-wheel	6-wheel
Journals, diameter and length, in.	7 x 14	7 x 14
General data, estimated:		
Rated tractive force, engine, lb.	62,200	62,800
Rated tractive force, booster, lb.	12,510	12,200
Total rated tractive force, lb.	74,710	75,000
Weight proportions:		
Weight on drivers ÷ weight engine, per cent	59.2	56.8
Weight on drivers ÷ tractive force	4.28	3.56
Weight of engine ÷ evaporation	92.43	94.14
Weight of engine ÷ comb. heating surface	64.63	65.98
Boiler proportions:		
Firebox heat. surface, per cent comb. heat. surface	5.04	5.53
Tube-flue heat. surface, per cent comb. heat. surface	64.9	64.6
Superheat. surface, per cent comb. heat. surface	30.06	29.91
Tube-flue heat. surface ÷ grate area	49.8	49.8
Firebox heat. surface ÷ grate area	3.87	4.26
Superheat. surface ÷ grate area	23.08	23.08
Comb. heat. surface ÷ grate area	76.75	77.12
Evaporation ÷ grate area	53.66	54.05
Tractive force ÷ grate area	688.05	829.6
Tractive force ÷ evaporation	15.40	15.35
Tractive force ÷ comb. heat. surface	8.97	10.76
Tractive force x dia. drivers ÷ comb. heat. surface	658.94	860.6



Made of electric cast steel, the pistons have thin walls and reduced hub diameter

A considerable reduction in the weight of reciprocating parts has been effected in the design of the later locomotives. Both locomotives are fitted with the multiledge guide and crossheads. On the later locomotives, however, the body of the crosshead has been reduced in size and strengthened by increasing the section connecting the piston-rod hub with the wrist-pin bosses. The pistons were furnished by the Locomotive Finished Material Company and are of electric cast-steel with thin

(*Continued on page 274*)

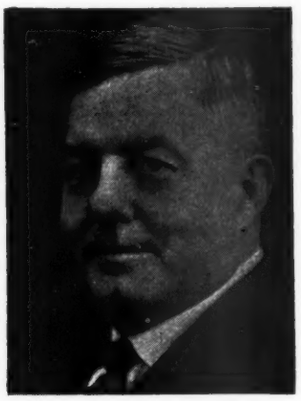

Bronze wearing Plates press fit finish all over
Tack Weld wearing Plates with Bronze in about 5 Places.
Cast Steel Machine R. and L. - R.H. shown.
Finish all over and tinned.
Grind finish

The crossheads of the new S. P. 4-8-4 locomotives have been reduced in size and strengthened by increasing certain section thicknesses

General Committee Acts on

Mechanical Division Reports

J. W. Burnett, Chairman



F. W. Hankins, Chairman-elect

The reports presented by the chairmen of twelve committees show that much constructive work has been done despite the adverse conditions prevailing during much of the past year — Standardization work proceeding on details of locomotive construction as well as in car designs

BECAUSE of the prevailing general business conditions, no annual meeting of the Mechanical Division of the Association of American Railroads was held this year. That the work of the Division might be carried forward with as little interruption and delay as possible, the General Committee held a meeting on June 29 at the Congress Hotel, Chicago, at which committee chairmen and chairmen of the important sub-committees were in attendance to present their reports, of which there were twelve, on the following subjects. Prices, Tank Cars, Loading Rules, Wheels, Brakes and Brake Equipment, Locomotive Construction, Arbitration, Couplers and Draft Gears, Underwriter's Laboratory Tests, Car Construction, Specifications, and Further Development of the Reciprocating Steam Locomotive.

The report on the Underwriter's Laboratory Tentative Outline for Inspection and Labeling of Self-Propelled Railroad Equipment Utilizing Internal Combustion Engines is a new one this year. The regulations submitted for the safe handling of liquefied petroleum gas promise to promote safety in the use of this fuel, now in growing demand for internal-combustion engines, coach lighting, heating in refrigerator cars, cooking in diners, etc., if they are adopted by the association.

Among the new subjects in the standing committee reports is the standard refrigerator car, for which the committee has developed a complete set of general specifications covering materials, workmanship, and the character of the major details of construction. The committee recommends holding in abeyance the development of complete standard designs pending the outcome of studies now under way to effect freight-car weight reduction.

During the course of the meeting the General Committee also listened to two progress reports, one on the passenger-car axle tests being conducted at the Timken research laboratory and one on failures of locomotive driving axles and crank pins, which were presented by W. I. Cantley, mechanical engineer of the Mechanical Division. These reports will be the subjects of articles which will appear in later issues.

W. H. Flynn, Vice-chairman-elect

V. R. Hawthorne, Secretary

For the first time new officers and members of the General Committee, to succeed those whose terms expire this year, have been elected by letter ballot rather than by ballot of the members in attendance at an annual meeting. Without exception, the retiring members of the board were re-elected. J. W. Burnett (general superintendent motive power and machinery, Union Pacific), the retiring chairman, was elected to serve for the unexpired term of W. H. Flynn, the vice-chairman elect. The officers and re-elected members of the General Committee are as follows: Chairman, F. W. Hankins, chief of motive power, Pennsylvania System; vice-chairman, W. H. Flynn, general superintendent motive power and rolling stock, New York Central System. General Committee: D. S. Ellis, chief mechanical officer, Chesapeake & Ohio; O. A. Garber, chief mechanical officer, Missouri Pacific; R. G. Henley, superintendent motive power, Norfolk & Western; F. R. Mays, general superintendent equipment, Illinois Central; John Purcell,

assistant to vice-president, Atchison, Topeka & Santa Fe; A. L. Ralston, general mechanical superintendent, New York, New Haven & Hartford, and Mr. Burnett.

Locomotive Construction

Exhaust Steam Injectors

During the year 1937, 59 locomotives were equipped with exhaust steam injectors and 25 locomotives on order for 1938 are also to be equipped. The steam pressures carried, or to be carried, by these locomotives ranged from 205 lb. to 300 lb. Fourteen of the locomotives being built during 1937 were equipped with turbo injectors. Twenty-two of the locomotives built during the year 1936 were equipped with exhaust-steam injectors, five of which were turbo injectors.

Advantages and Disadvantages of Higher Boiler Pressures

There has not been a sufficient number of locomotives in service with pressures above 300 lb. per sq. in. a long enough time to develop their full operating efficiency and to get comparative cost of their maintenance expense. This is particularly true at present because of the reduced business being done by the railroads with less locomotive miles being made, and no additional information is available from the various roads over that contained in last year's report. However, the fact that additional locomotives are being built at the present time with over 300 lb. boiler pressure indicates the trend is still upward as regards this feature.

The boiler should be as large as possible so as to have available the necessary reserve capacity to keep the heavy tonnage trains moving at the prescribed speed under all conditions.

One important thing necessary to obtain the full benefit of high pressure is a steam distribution valve which can be made to cut off at a low percentage of the stroke, and some progress is being made in this direction now by the use of the double-ported valve, also the poppet valve, though much remains to be accomplished with the latter.

The committee recommends that this be accepted as a progress report and the committee continued, to report again next year.

[The sub-committee appended a tabular comparison of dimension and ratios of several high-pressure locomotives. These include two 2-10-4 locomotives; one for the A. T. & S. F. built in 1930 and one for the K. C. S. built in 1937; two 4-8-4 locomotives, both built in 1937, one for the Union Pacific, and one for the A. T. & S. F.; and three 4-6-4 locomotives, one for the B. & O., built in 1936, one for the A. T. & S. F., built in 1937, and one for the C. & N. W., built in 1938. With two exceptions, all of these locomotives carry a boiler pressure of 300 lb. The K. C. S. 2-10-4 locomotive carries 310 lb. and the B. & O. 4-6-4 locomotive carries 350 lb.—Editor.]

Development and Use of Oil-Electric Locomotives

Your committee has continued investigations of principal developments and has analyzed available data and statements submitted showing the number of Diesel locomotives in service in the United States and Canada, including new installations for the year 1937 and those units on order as of March 1, 1938. The information has been assembled through the assistance and records of various manufacturers as well as operating companies.

This study indicates that in 1937 a total of 155 locomotive units were placed in service. There was greater progress in the development and installation of new units of Diesel equipment than in any previous year. During this same period there were three 3,600-hp. and two 5,400-hp. units placed in service. The 5,400-hp. units are the first of this capacity and, prior to 1937, there was only one 3,600-hp. unit in service. There are on order, as of March 1, 1938, four additional 3,600-hp. units. The trend towards larger capacities is indicated by six 1,800-hp. units on order as of March 1, 1938. Units of 600 hp. capacity still seem to predominate the field for switching locomotives, 87 locomotives of this capacity being installed during 1937, with 30 additional on order as of March 1, 1938. The next greatest demand was for 900-hp. units, 42 of which were installed during 1937, with 7 more on order as of March 1, 1938.

It is also noted that there were seven installations of Diesel

Assignment of Diesel Locomotives in Service as of December 31, 1937, by Class of Service

Hp. Less than	Switch.	Transfer	Road freight	Road passenger	Grand total
300	13	..	..	..	13
300	96[1]	1	..	..	97
310	1	..	..	..	1
400	6	..	..	..	6
460	3	..	..	..	3
500	..	1	..	..	1
530	7[2]	..	..	..	7
550	1	..	..	..	1
600	168[3]	1	1	1	171
660	5	..	..	..	5
750	..	..	1	..	1
800	6[3]	..	..	1	7
900	43	..	..	..	43
950	..	..	..	1	1
1,000	4	..	..	..	4
1,200	..	..	..	6	6
1,330	..	..	..	2[4]	2
1,600	1	..	..	..	1
1,800	..	2	..	3	5
2,000	..	1	..	..	1
2,100	..	..	..	1	1
2,400	..	..	..	4	4
3,000	..	..	..	2	2
3,600	..	..	..	4	4
5,400	..	..	..	2	2
Total	354	6	2	27	389

[1] 38 units used in combination switch and transfer of passenger equipment.
[2] One unit in combination switch and road freight service.
[3] Two 600-hp. and three 800-hp. units used in combination switch and transfer service.
[4] Used single in passenger service and in combination with freight service.

Operating Statistics and Maintenance Cost of Diesel Locomotives

Exhibit No. 1

Name of Operating Company _____ Unit Number or Identification _____

Class of Service _____ Horsepower _____

Month or Calendar Year	Miles or hours Assigned and Operated			Lubricating Oil		Fuel Oil		Repairs					Cost of Repairs per Hour or Mile
	Assigned	Operated	Per Cent of Assignment Operated	Gallons Used	Gallons Per Hour or Mile	Gallons Used	Gallons Per Hour or Mile	Electrical Equipment Labor	Electrical Equipment Material	Diesel Labor	Diesel Material	Total	

Report on basis of cost or amount per hour for engines in switch and transfer service

Report on basis of cost or amount per mile for engines in road freight or road passenger service

Form for collecting Diesel-locomotive operating and maintenance statistics recommended by the committee

locomotives with less than 300 hp. during the year, while prior to 1937 there had only been six such installations, which indicates that this type of equipment is being adapted to more general service and this helps to account for the fact that of the 389 units in service as of January 1, 1938, 155 or 40 per cent were placed in service during the year 1937.

The table shows the assignment of Diesel locomotives by class of service and the preponderance of these units still remains in switching service, with the addition of 143 units to the 210 so reported in 1936, although many of the units of 600 hp. and greater are reported as used in combination switch and transfer service. There has been a marked increase in the number of Diesel engines used in road passenger service. Units so reported were increased to 27 from 16, an increase of 69 per cent.

Attempt has been made to compile comparative operating statistics designed to indicate the availability of these units, lubricating and fuel oil consumption and cost of repairs, separated between electrical equipment and Diesel equipment, and the total cost of repairs per locomotive hour operated, and while the committee hopes to be able to assemble some interesting information along the above lines for future reference and comparison with cost of maintenance and fuel and lubrication costs for steam locomotives, to date this has not been completed.

It is the recommendation of the committee that the association adopt a uniform report from which such information can be readily assembled and this report should be so arranged as to permit the entry of each month's figures together with the cumlative for previous months of the year, and finally, the total figures for the full year.

Design of Fundamental Parts of Locomotives

The sub-committee dealing with the design of fundamental parts of locomotives reported on three subjects.

Driving-Wheel Centers with Thin Wall Sections

This year the committee discontinued the statement giving details of the application of the various types of driving-wheel centers with thin wall sections, since they are now being used almost universally. The answers to a questionnaire, to which ten roads replied, indicates that only three centers, on two roads, were rejected because of defects showing up when new centers were machined, but that all except three of the roads have experienced some cracking of the castings after periods of service, usually, but not always, between the crank-pin and axle hubs. Some of these wheels were of early designs which have later been improved. Some were put back in service after welding; others were replaced by new castings.

The American Locomotive Company reports rejections of the thin-wall-type wheel centers amounting to 10½ per cent, March, 1937, to March, 1938, and rejections of 20 per cent of the spoke-type wheel centers used during the same period. Baldwin reports shrinkage cavities in the ribs separating counterbalance pockets in open-face counterbalances, and the development of cracks in the hubs and counterbalance walls (not the open-face type) of some wheels after a year's service.

Only two of the roads replying report the new wheel centers out of round after service. The other roads report no occasion to true up centers, and most of them report no tests to determine roundness. The Missouri Pacific reported one main wheel from a 2-10-2 type locomotive which checked 1/32 in. out of round after two years' service. The Chesapeake & Ohio reported a maximum out-of-roundness of 1/8 in. on several wheels checked after service. Several wheels on this road of an early design, since changed by the manufacturer, were found to be dished out as much as ¼ in. after service.

The Chicago & North Western, with service up to 300,000 miles, finds the wheels satisfactory and much less dishing of these centers due to tire-shrinkage pressure. The Missouri Pacific and the Illinois Central both comment on the better counterbalance obtainable. The Missouri Pacific was able to increase the speed of 14 2-10-2 type locomotives from 35 m.p.h. to 55 m.p.h. without track damage after the new type centers were applied on the main axles.

Furnace or Firebox Support and Waist Sheets

The General Steel Castings Corporation is making some tests on a locomotive bed of a 4-8-4 type locomotive now being built by the Baldwin Locomotive Works. These tests are to be made in such a manner as to determine, if possible, the value of waist sheets between boiler and engine bed at various points and under different conditions of service as well as when locomotives are lifted in the erecting shop. A copy of the report on the tests will be furnished to the committee when they have all been completed.

Typical Methods of Lubricating Main and Side Rods

In response to a request for such information, the sub-committee submitted drawings of several arrangements of grease cavities, with pressure fittings, in main-rod back ends and in crank pins which have been used successfully on locomotives built in recent years. These are for inclusion in the Manual.

Screw Threads

The A. A. R. standard for screw threads is the U. S. Standard, and is described and illustrated on page L-27 of the Manual, no provision being made, however, for different classes of fits or tolerances.

The American Standards Association has approved and issued an American Standard for screw threads which is identical with the A. A. R. standard in form of thread, but provides for four classes of fit to suit various requirements. It is, therefore, recommended that page L-27 of the Manual be revised by the addition of a paragraph reading as follows: "When necessary or desirable to specify a particular class of fit, reference should be made to American Standards Association Standard for Screw Threads B 1.1-1935."

Roller Bearings for Locomotives and Tenders

This report covers steam and electric locomotives, but does not include Diesel-electric or high-speed streamline trains. Replies to questionnaire were received from 126 roads, 91 of which reported having no roller-bearing applications and 35 roads reported on applications. During the year ended December 1, 1937, new applications of roller bearings were made as follows:

	Existing road locomotives	New road locomotives	Total road locomotives
Engine truck	34	67	101
Drivers	6	52	58
Trailer truck	3	42	45
Tender truck	10	27	37
Total road locomotives built during 1937			325

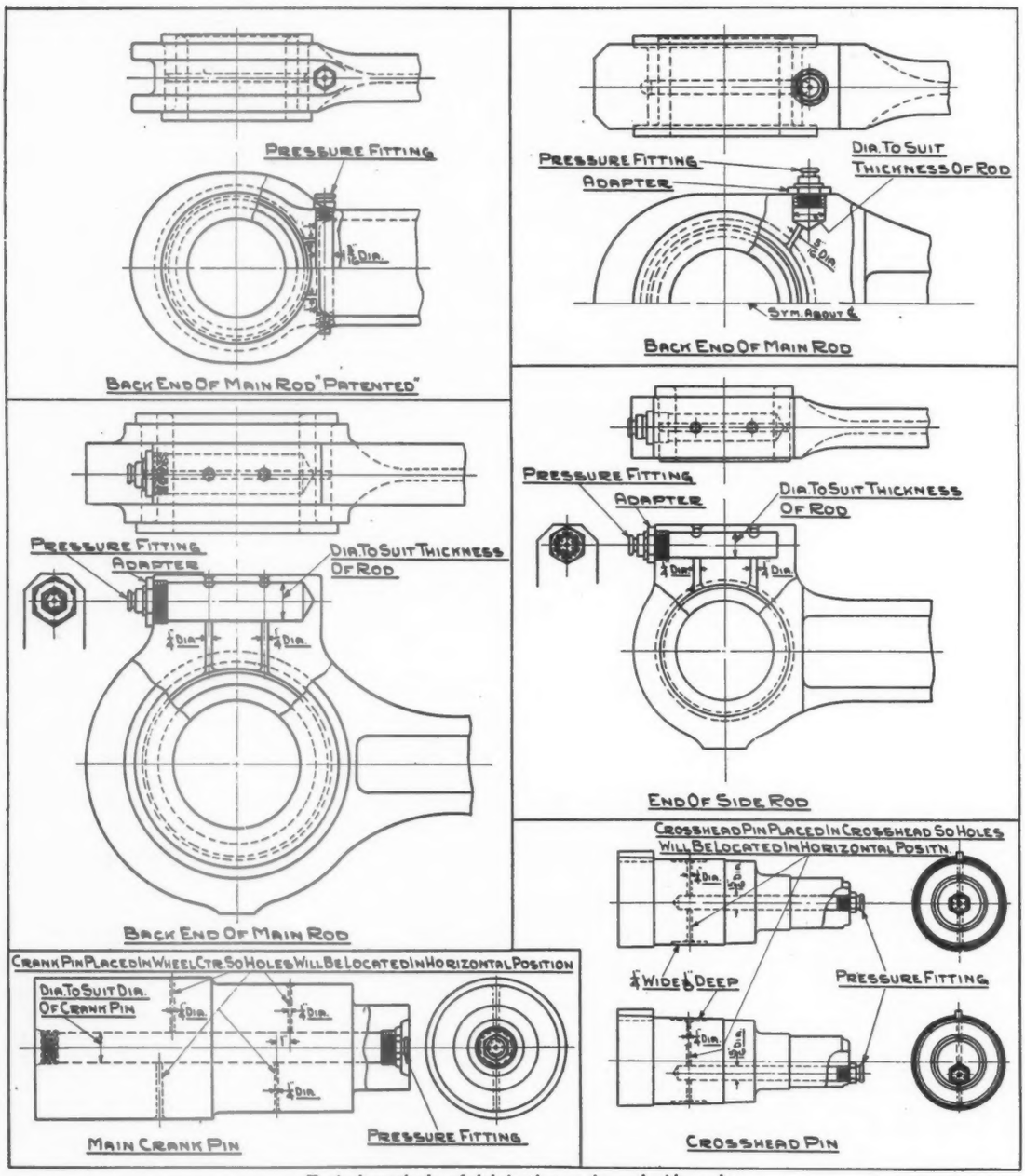
From the reports as of December 1, 1937, the following number of locomotives and tenders are in service with roller bearings:

On	No. locomotives
Engine truck	689
Drivers	280
Trailer truck	149
Tender trucks	578

Failures of roller bearings on drivers and on engine, trailer and tender trucks were comparatively few and resulted mainly from broken or worn retaining cages, broken or loose sleeves, shelled races and rollers, and broken races and rollers. Roller bearings which have failed are being replaced, in some cases, with bearings in kind and, in others, heavier cages or bearings with heavier rollers are being applied.

One Road's Experience with Roller Bearings

Engine Truck Axles	
Total number of locomotives equipped	257
Total locomotive mileage	142,260,810
Average locomotive mileage per road failure	28,452,162
Average locomotive mileage per defective bearing found by inspection	764,843
Average locomotive mileage per failed and defective bearing	744,821
Average mileage of failed and defective bearing (on bearings when mileage is known)	286,513
Road failure per 50,000 miles	.001757
Tender Axles	
Number of tenders equipped	209
Total tender mileage, Dec. 1, 1936, to June 1, 1937	11,130,887
Average tender miles per road failure	.....
Average tender miles per failed and defective bearing	1,391,361
Average miles of failed bearings	.....
Average miles of defective bearings	89,954
Average miles of failed and defective bearings	89,954


PRESSURE FITTING
BACK END OF MAIN ROD "PATENTED"
PRESSURE FITTING
ADAPTER
DIA. TO SUIT THICKNESS OF ROD
SYM. ABOUT ℄
BACK END OF MAIN ROD
PRESSURE FITTING
ADAPTER
DIA. TO SUIT THICKNESS OF ROD
BACK END OF MAIN ROD
PRESSURE FITTING
ADAPTER
DIA. TO SUIT THICKNESS OF ROD
END OF SIDE ROD
CRANK PIN PLACED IN WHEEL CTR SO HOLES WILL BE LOCATED IN HORIZONTAL POSITION
DIA. TO SUIT DIA. OF CRANK PIN
MAIN CRANK PIN
PRESSURE FITTING
CROSSHEAD PIN PLACED IN CROSSHEAD SO HOLES WILL BE LOCATED IN HORIZONTAL POSITN.
WIDE DEEP
PRESSURE FITTING
CROSSHEAD PIN

Typical methods of lubricating main and side rods

The following mileages between date of application and date of failure of roller bearings are reported by some of the roads:

	Minimum	Maximum
Engine trucks	174,098	317,913
Drivers	301,678	319,675
Trailer trucks	263,000	546,974
Tender trucks	169,903	682,061

One road reported a failure of roller bearings on drivers at 17,608 miles and another road at 22,573 miles.

While a complete report of all failures cannot be made because of insufficient information submitted with the reports, the data in the table was submitted by one large user of roller bearings who has given a complete report on locomotive engine trucks and tender trucks equipped as of June 1, 1937.

While sufficient information was not received to determine the total mileage made to date by locomotives equipped with roller bearings, some of the roads reported the following maximum mileages being made without a roller-bearing failure:

Engine truck	736,682
Drivers	346,994
Trailer truck	637,848
Tender truck	345,240

No trailer-truck or tender-truck axles have failed during the year ended December 1, 1937, but one road reported removing some main driving axles for inspection after making 124,000 to 155,000 miles and detected incipient cracks at intervals around the axle just within wheel fit. Replacement axles having a slightly different chemical composition will be applied for experimental purposes. Another reported removing some engine-truck axles that had made 120,000 miles because inspection revealed hair-line cracks and lines of demarcation around the journal where the race and collar come together.

Main and Side Rods
Valve Gears

New applications of roller bearings were made to main and side rods of three locomotives during the year ended December 1, 1937. The total applications which had been made as of that date are two locomotives on the main crank pin and five locomotives on all crank pins. Grease is used on the two locomotives having main-pin-bearing applications and oil on the five having main and side-rod bearings.

Very few failures occurred during the past year and their

causes are attributed to failure of roller-bearing cages, rod slipping on the crosshead pin, and cracked crosshead. The total mileage as of December 1, 1937, by four of the locomotives was 513,808 miles.

Seventeen locomotives were equipped with roller bearings to various parts of the valve gear during the year ended December 1, 1937, making a total of 99 locomotives now in service as of that date. No failures were reported.

Your committee will continue the tabulation of roller bearing applications, also develop information relative to facilities; such as tools, etc., that are necessary for taking care of roller bearing equipment, and will also consider economics, engineering of installations, and the lubrication of roller bearings.

Size of Copper Flue Ferrules and Copper Tubing

The sub-committee prepared a questionnaire covering the present sizes of flue ferrules, to which replies were received from 35 representative railroads owning approximately 70 per cent of the total locomotive ownership of the Class I railroads in the United States and Canada. These replies were carefully tabulated and it was found that considerable differences existed with respect to size of flue ferrules used, there being a total of 251 different sizes in use.

Proposed Standards for Flue Ferrules

I. D. ferrule	O. D. ferrule	Thickness of ferrule, U. S. S. gage No.	Length of ferrule, in., for application to ½ in.-9/16 in. sheet	Length of ferrule, in., for application to 11/16 in.-¾ in. sheet	For application to tube or flue as follows: Nom. size of tube or flue, in.	Swaged to diam., in.	Diam. of hole in tube sheet, in.
1.875	2.000	16	5/8	¾	2	1.875	2
1.875	2.062	13	5/8	¾			2 1/16
1.875	2.125	11	5/8	¾			2⅛
1.750	1.875	16	5/8	¾	2	1.750	1⅞
1.750	1.937	13	5/8	¾			1 15/16
1.750	2.000	11	5/8	¾			2
2.125	2.250	16	5/8	¾	2¼	2.125	2¼
2.125	2.312	13	5/8	¾			2 5/16
2.125	2.375	11	5/8	¾			2⅜
2.000	2.125	16	5/8	¾	2¼	2.000	2⅛
2.000	2.187	13	5/8	¾			2 3/16
2.000	2.250	11	5/8	¾			2¼
3.000	3.125	16	5/8	¾	3½	3.000	3⅛
3.000	3.187	13	5/8	¾			3 3/16
3.000	3.250	11	5/8	¾			3¼
3.125	3.250	16	5/8	¾	3¾	3.125	3¼
3.125	3.312	13	5/8	¾			3 5/16
3.125	3.375	11	5/8	¾			3⅜
4.500	4.625	16	5/8	¾	5⅜	4.500	4⅝
4.500	4.687	13	5/8	¾	and		4 11/16
4.500	4.750	11	5/8	¾	5½		4¾
3.000	3.125	16	5/8	¾	3-in.	Not	3⅛
3.000	3.187	13	5/8	¾	arch	swaged	3 3/16
3.000	3.250	11	5/8	¾	tube		3¼
3.500	3.625	16	5/8	¾	3½-in.	Not	3⅝
3.500	3.687	13	5/8	¾	arch	swaged	3 11/16
3.500	3.750	11	5/8	¾	tube		3¾

Proposed standards were set up. These standards comprise a total of 48 different sizes of flue ferrules, there being 24 combinations of diameter and gage and two lengths for each diameter and gage.

From replies received from the representative roads to which the original questionnaire was sent, it is believed that these proposed standards can be adopted by the majority of the roads and *it is recommended that they be submitted to letter ballot.*

The subcommittee prepared a questionnaire covering the present sizes of copper tubing being used, to which replies were received from 35 representative railroads owning approximately 70 per cent of the total locomotive ownership of the Class I railroads in the United States and Canada. These replies were carefully tabulated and it was found that considerable difference existed with respect to the sizes of copper tubing used, there being a total of 152 variations in size and gage.

In consulation with the Copper and Brass Research Association proposed standards were set up. They reduce the number of variations in size and gage from 152 to 26. Some sizes of tubing now being used such as 5/16 in. O. D., ⅛ in. iron pipe size, 9/16 in. O. D., 21/32 in. O. D., ⅜ in. iron pipe size, 11/16 in. O. D., 13/16 in. O. D., ½ in. iron pipe size, ¾ in. and 1 in. iron pipe size have been omitted from the proposed standards. It was found that there were very few users of these particular sizes, and it is felt that one of the proposed standard sizes can be substituted without difficulty.

If these proposed standards are adopted and lived up to by the railroads, it will result in a considerable saving to the roads in the cost of copper tubing, *and it is recommended that they be submitted to letter ballot.*

Failures of Axles and Crank Pins

The subcommittee issued a questionnaire which was sent out by the Mechanical Division December 2, 1936, to 38 railroads in the United States and Canada requesting information covering the failures in service of axles and crank pins during the six-year period ended December 31, 1936. Replies to these questionnaires have been analyzed and results of this analysis are given in the progress report on failures of driving axles and crank pins on steam locomotives which has been prepared by the subcommittee and sent to the members. The committee feels that, if the members receiving copies of this progress report will analyze it very carefully, they may find therein information that will be helpful to them in reducing failures on axles and crank pins similar to those now being experienced.

The committee is continuing the studies with respect to crank pins, as the subject of driving axles is to be given consideration following completion of tests now being conducted at Timken on passenger-car axles. The analysis of the returns received to the questionnaire indicates the need for a more intensive and specific analysis of driving-axle and crank-pin failures as they occur, as many of the returns were very incomplete. Attention to this point would materially assist the work of the committee in its future study on crank-pin failures.

Proposed Standards for Copper Tubing for Railroad Service

Actual O. D., in.	For air brake, air conditioning and miscellaneous uses: Wall thickness In.	B. W. G. No.	Wt. per ft., lb.	Calculated bursting press., lb. per sq. in.	For lubricator oil lines and saturated steam up to 450 deg. F.: Wall thickness In.	B. W. G. No.	Wt. per ft., lb.	Calculated bursting press., lb. per sq. in.
¼	0.032	21	0.085	7,680	0.065	16	0.146	15,600
3/8	0.032	21	0.133	5,120	0.065	16	0.245	10,400
½	0.049	18	0.269	5,880	0.083	14	0.421	9,970
5/8	0.049	18	0.344	4,700	0.083	14	0.547	7,970
¾	0.049	18	0.418	3,920	0.095	13	0.757	7,590
7/8	0.065	16	0.641	4,460	0.095	13	0.901	6,520
1	....	..	....	....	0.109	12	1.183	6,540
1⅛	0.065	16	0.839	3,470	....	..	....	....
1¼	....	..	....	....	0.109	12	1.514	5,230
1⅜	0.065	16	1.04	3,110	....	..	....	....
1½	....	..	....	....	0.120	11	2.02	4,700
1⅝	0.072	15	1.36	2,660	....	..	....	....
1¾	....	..	....	....	0.120	11	2.38	4,120
2	....	..	....	....	0.120	11	2.74	3,600
2¼	....	..	....	....	0.134	10	3.45	3,600
2½	....	..	....	....	0.134	10	3.86	3,240
2¾	....	..	....	....	0.148	9	4.69	3,230
3	....	..	....	....	0.148	9	5.14	2,960
3¼	....	..	....	....	0.165	8	6.19	3,050
3½	....	..	....	....	0.165	8	6.69	2,830

Bursting pressure is calculated from the formula p = 2 × wall thickness × tensile strength ÷ outside diameter. Tensile strength = 30,000 lb. per sq. in.

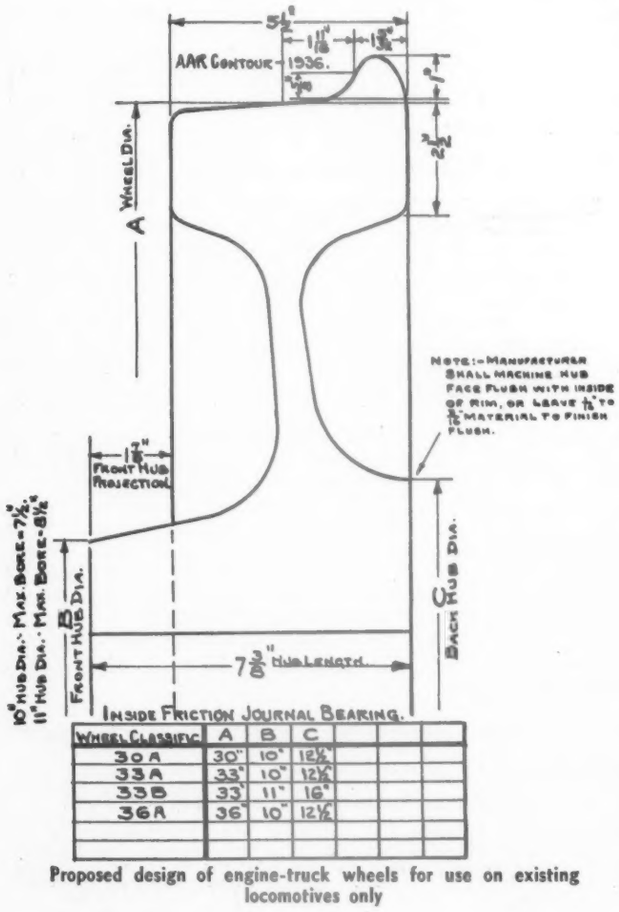
Standardization of Rolled-Steel Wheels for Engine Trucks

From the information received in answer to a questionnaire, to which 118 railroads replied, the committee developed that at the present time there are 142 designs of engine-truck wheels in use of various diameters from 26 in. to 37 in. It is felt that wheels of 30-in., 33-in. and 36-in. diameters can be proposed for new and existing locomotives. To meet the conditions on a number of existing locomotives another design of wheels of the same diameter is proposed. The latter design is not recommended for new locomotives and is to be used only until such time as the locomotives now requiring them are removed from service. The proposed designs, ten in number, will take care of approximately 93.5 per cent of the locomotives reported, either as the designs now stand, or with slight modification.

It is believed that these proposed standards can be adopted, and *it is recommended that they be submitted to letter ballot.*

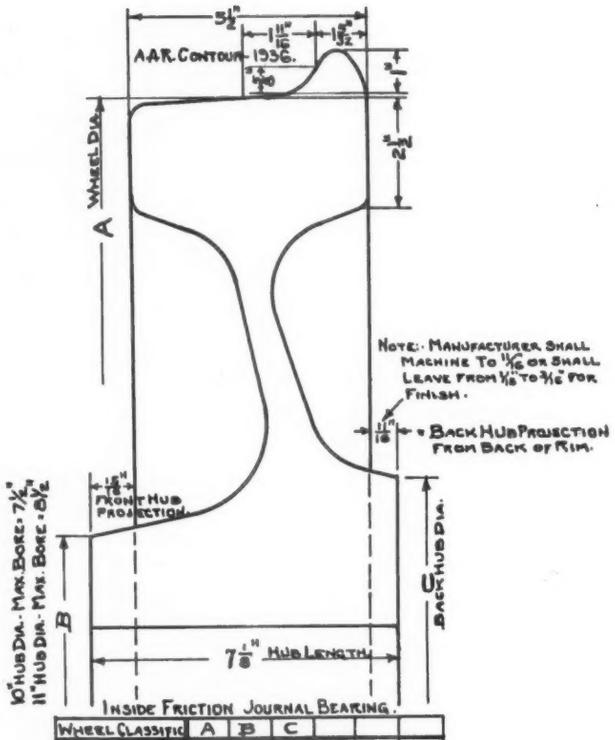
Progress Reports

The subcommittee on Standardization of Valves reported progress on the design of globe and angle valves for superheated steam up to 400 lb. pressure and 700 deg. F. temperature. Progress reports were also presented by the subcommittees investigating the shelling of trailer tires, the subcommittee on the construction of locomotive boilers by the fusion-welding process, which is keeping in touch with the service developments of the D. & H. fusion-welded boiler, and by the sub-committee investigating the question of lateral on the front wheels of four-wheel trailing trucks, spring suspension and rail stresses. A joint subcommittee of the Committee on Couplers and Draft Gears and the Committee on Locomotive Construction has been appointed to consider draft gears for the rear of the tenders of passenger locomotives with a view to the improvement of the riding of passenger cars, particularly of the lightweight type under certain conditions when hauled by steam locomotives.


5½"
A.A.R. Contour 1936.
Wheel Dia. A
2¾"
Note:- Manufacturer shall machine hub face flush with inside of rim, or leave ⅛" to ¼" material to finish flush.
1⅞" Front Hub Projection
10" Hub Dia.- Max. Bore-7½"
11" Hub Dia.- Max. Bore-8½"
B Front Hub Dia.
C Back Hub Dia.
7⅜" Hub Length
Inside Friction Journal Bearing.

Wheel Classific	A	B	C			
30 A	30"	10"	12½"			
33 A	33"	10"	12½"			
33 B	33"	11"	16"			
36 A	36"	10"	12½"			

Proposed design of engine-truck wheels for use on existing locomotives only


5½"
A.A.R. Contour 1936.
Wheel Dia. A
Note:- Manufacturer shall machine to 1/16 or shall leave from 1/8 to 3/16 for finish.
Back Hub Projection from back of rim.
1⅞" Front Hub Projection
10" Hub Dia.- Max. Bore-7½"
11" Hub Dia.- Max. Bore-8½"
B
C Back Hub Dia.
7⅜" Hub Length
Inside Friction Journal Bearing.

Wheel Classific	A	B	C			
30 A	30"	10"	12½"			
30 B	30"	11"	16"			
33 A	33"	10"	12½"			
33 B	33"	11"	16"			
36 A	36"	10"	12½"			
36 B	36"	11"	16"			

Proposed design of engine-truck wheels for use on new and existing locomotives

The sub-committee on Stresses in Locomotive Rods and Motion Work recommends holding in abeyance the formulation of a standard set of rules for determining stress allowances in alloy-steel rods and other motion work of light sections in view of the limited experience with parts of such design.

A subcommittee recommends that the proposed simplified-practice recommendations for machine, carriage and lag bolts submitted on August 20, 1937, by the National Bureau of Standards of the United States Department of Commerce be adopted as recommended practice of the association.

The report was signed by H. H. Lanning (chairman), mechanical engineer, Atchison, Topeka & Santa Fe; H. P. Allstrand (vice-chairman), principal assistant superintendent motive power and machinery, Chicago & North Western; G. McCormick, general superintendent motive power, Southern Pacific; W. F. Connal, mechanical engineer, Canadian National; J. E. Ennis, engineering assistant, New York Central; L. H. Kueck, chief mechanical engineer, Missouri Pacific Lines; J. B. Blackburn, mechanical assistant to chief mechanical officer, Chesapeake & Ohio; K. Cartwright, mechanical engineer, New York, New Haven & Hartford; Henry Yoerg, general superintendent motive power, Great Northern; G. C. Christy, superintendent motive power, Illinois Central; E. L. Bachman, general superintendent motive power, Pennsylvania, and W. R. Hedeman, engineer of tests, Baltimore & Ohio.

The report was approved and recommendations ordered submitted to letter ballot.

Steam Locomotive Development

Five meetings have been held since the appointment of your Committee on Further Development of the Reciprocating Steam Locomotive, at which all of the members have either been present in person or represented. The various phases of the work of

the committee have been assigned to a number of small subcommittees, as follows: (1) technical, (2) cylinders and valves, (3) boilers, (4) design. These subcommittees have each held a number of meetings.

As a result of the study given the subject of a reciprocating steam locomotive to produce a sustained speed of 100 m. p. h. on straight level track with a 1,000-ton trailing load, the following definite specifications have been agreed to:

(1) 4,000 draw-bar horsepower, as required for a 1,000-ton trailing load at 100 m.p.h. sustained speed
(2) Cylinder hp. 6,400
(3) Four-cylinder engine
(4) Approximately 300 lb. boiler pressure—750 deg. F. steam temperature at the boiler
(5) Conventional radial-stay type boiler
(6) Factor of adhesion, 4.5 if possible
(7) Boiler to be able to supply 100 per cent cylinder demand plus steam demand for auxiliaries
(8) Calculations to be based on bituminous coal having 12,000 B.t.u.
(9) Design of locomotive to be of conventional type with provisions made for streamlining
(10) Driving-wheel arrangement to be 4-4 coupled
(11) Engine designed for maximum curvature of 18 deg.
(12) Driving-wheel diameter, 84 in. preferred
(13) Anti-friction journal bearings throughout

The committee will proceed on the above outlined fundamental basis in working up the recommended design and does not anticipate going into details only in so far as necessary to support its recommendations.

In its investigation of the problem of improving present designs of reciprocating steam locomotives, the committee has recognized the importance of conveying the steam from the boiler to the cylinders with the least possible loss of pressure and at this time suggests to the members of the Mechanical Division that the matter of steam passages from the throttle through the dry pipe, superheater steam pipe, cylinders, both live and exhaust passages, be carefully analyzed as this, in our opinion, holds promise of increased efficiency in the performance of many existing locomotives. Furthermore, the committee also suggests a closer study and policing of detail parts of existing locomotives.

Further recommendation for the particular problem in question, it is the committee's intention to study and analyze various detailed designs of the major component parts of locomotives, such as boilers, valves, valve gears, superheaters, machinery, counterbalance, etc., with the idea of submitting recommendations covering improvements in existing steam locomotives.

A special subcommittee of your committee observed actual road dynamometer tests on the 4-6-4 N. Y. C. locomotive and collected data, which will be supplemented by actual observations of road tests of the Santa Fe 4-8-4 locomotive at an early date. All of this data will be compared with the Pennsylvania Altoona testplant data and Santa Fe 4-6-4 road test data now collected. Following the analysis of this test data, it is possible that some change may be recommended in the fundamentals mentioned in this report.

Your committee wishes to acknowledge the co-operation of the New York Central, Pennsylvania, and Atchison, Topeka & Santa Fe in making this information available.

Minority Report Submitted by J. E. Ennis

In dissenting from the majority report, J. E. Ennis, engineering assistant, New York Central, made the following statement:

The committee has assigned to itself, and up to the present time has devoted its sole attention to, the design of a reciprocating steam locomotive capable of hauling a train of 1,000 tons at a sustained speed of 100 m. p. h. on level tangent track.

To meet these conditions, the committee proposes a locomotive with four cylinders and four driving axles, to develop 4,000 hp. at the draw-bar and 6,400 cylinder hp. There are little test data to substantiate these horsepower requirements, and there are some data indicating that considerably less horsepower would be required at the cylinders.

There are in existence and available, locomotives with two cylinders and three pairs of driving wheels, which it is reasonably sure could either meet the assumed requirements or approach them very closely, and it is believed that the committee should have thoroughly explored the possibilities of these locomotives before committing itself to an experimental design of the type proposed. If none of these locomotives could fulfill the stated conditions, there is the practical certainty that a locomotive of proper design with two cylinders and four pairs of driving wheels would suffice, thus providing a locomotive of known conventional type, commonly acceptable to the railroads, which should be lower in first cost and cheaper to operate and maintain, than the very unusual design proposed by the committee.

The report was presented by Chairman D. S. Ellis, chief mechanical officer, Chesapeake & Ohio, Cleveland, Ohio; Vice-chairman W. I. Cantley, mechanical engineer, Association of American Railroads, Chicago; W. R. Hedeman, engineer of tests, Baltimore & Ohio, Baltimore, Md.; J. E. Ennis, engr. asst., New York Central, New York; W. R. Elsey, mechanical engineer, Pennsylvania, Philadelphia, Pa.; J. M. Nicholson, mechanical supt., Atchison, Topeka & Santa Fe, Topeka, Kan.; Lawford H. Fry, railway engineer, Edgewater Steel Company, Pittsburgh, Pa.; W. E. Woodward, vice-president, Lima Locomotive Works, Inc., New York; H. Glaenzer, vice-president, Baldwin Locomotive Works, Philadelphia, Pa.; J. B. Ennis, vice-president, American Locomotive Company, New York; E. G. Bailey, vice-president, Babcock & Wilcox Company, New York; Edward C. Schmidt, professor of railway engineering, University of Illinois, Urbana, Ill.

(*The report was accepted as a progress report, the committee given a vote of thanks and assured of the whole-hearted support of the general committee in its further work. The committee was instructed to work up plans for testing the latest types of steam locomotives using a dynamometer car where necessary, and submit recommendations to the general committee. These tests are to include the latest type of four-cylinder locomotives now in service.*)

Car Construction

Designs of Standard Cars

On January 25, 1938, a joint meeting was held of the full Car Construction Committee and the Freight Car Design Committee of the American Railway Car Institute for the purpose of making plans for economic study and development of lightweight car designs, in line with the program of 1932. It was agreed that the initial studies would be based on the box car having inside dimensions of 40 ft. 6 in. long, 10 ft. high at the eaves and 9 ft. 2 in. wide and that the types of construction to be developed under this further cooperative effort of the car builders, the railroads and the specialty manufacturers would be as follows: (a) improved and lightened design in carbon-steel riveted construction; (b) same as (a) except alloy steel with combination of welding and riveting; (c) alloy steel largely of welded construction; (d) combination of carbon steel riveted and welded construction. Some work has been performed but progress only can be reported at this time.

New House Type and Hopper Cars Ordered June 10, 1937, to May 4, 1938

Design	No. of cars	Per cent of total
A. A. R. throughout or conforming closely thereto, including lightweight alloy steel to A. A. R. base designs; house cars to the larger inside clear dimensions; box, except underframe with floating center sills, and hoppers with inside dimensions to meet specific conditions	8,640	87.63
Not A. A. R. except new standard center-sill section and 25¾-in. truck-center-plate height	1,175	11.92
Not A. A. R.	45	.45
Total	9,860	

NOTE: In addition to the house and hopper type cars, orders were placed for refrigerator, gondola, ballast and special type cars which bring the total cars ordered up to 12,460, of which 12,065, or 96.83 per cent, have a standard center-plate height of 25¾ in.; 350, or 2.81 per cent, have 26¾ in. center-plate height, and the remaining 45 cars, or 0.36 per cent, have special center-plate heights. With the exception of refrigerator cars, no standard designs of these types have been requested or produced.

After the box-car design is disposed of, it is planned to proceed with the automobile car of both 40 ft. 6 in. and 50 ft. 6 in. inside length and then later to take up the study of hopper cars.

Standard Refrigerator Car

In accordance with program as outlined in the 1937 report of the Construction, the development of a design for a standard refrigerator car for freight service has been proceeded with in

cooperation with the A. R. C. I. and the Refrigerator Car Operators' Committee, resulting in formulation of specifications covering fundamentals of design as agreed upon by all concerned.

In view of studies now being made to effect further reductions in weight by the use of alloy steels and welded construction, it has been decided that it would not be advisable at this time to prepare a complete set of detail drawings covering the refrigerator car and that under the circumstances the matter would be properly protected by adherence to standard general dimensions and other basic features as covered by the specifications which are included as part of this report. *Recommended for letter ballot.*

Specification for Standard Freight Refrigerator Car

(Iced, Ventilated Type, Suitable for Fruits and Vegetables)

1—*General*—Cars, when delivered shall be complete in all parts ready for service and shall conform to the following specifications which are intended to cover general construction features and assembly practices.

2—*Material*—All material shall conform to A.A.R. specifications or to those of the purchaser provided the requirements of the purchaser's specifications are equivalent to those of the A.A.R. All steel plates ¼ in. and less in thickness, and pressed parts made therefrom shall include a copper content of not less than 0.20 per cent.

3—*Workmanship*—(a) All work must be laid out to template to insure interchangeability and proper assembly of parts.

(b) All rivet holes through draft sills and parts riveted to draft sills, also in bolsters and center sills at bolsters must be punched to the exact size of the rivet and reamed 1/16 in. larger than the diameter of the rivet except where otherwise specified on drawings. The holes must register and rivets must have full bearing through each part. If necessary to ream the holes more than 1/16 in. larger, the size of the rivets must be increased proportionally. All rivets in bolster center fillers to be driven by machine wherever possible. All other rivet holes in car must register and have full bearing all around for the rivet. The use of drift pins more than 1/16 in. larger in diameter than rivets will not be permitted. All parts must be securely and tightly clamped together before riveting and in no case must the rivets be depended upon to draw the parts together. Rivets, after they are driven, shall completely fill the holes, and shall have heads, of the proper shape lying tightly against the sheets or castings.

(c) Flanging of sheets must be true to shape to provide close contact with contiguous parts.

(d) Joints in super-structure and roof must be water tight.

(e) Side bearing clearance shall be adjusted within the limits of ⅛ to ¼ in. per bearing and shall be measured at each bearing with car on level tangent track with car body level. Total side-bearing clearance at BR and AL corners, must be made the same as total clearance at BL and AR corners with permissible variation not to exceed ⅛ in.

4—*General Dimensions*—Nominal capacity, 40 tons; inside clear length between bunkers, 33 ft. 2¾ in.; inside width between lining, 8 ft. 3 in.; inside height, floor to ceiling, 7 ft. 9 in.; inside height, floor rack to ceiling, min., 7 ft. 3 in.; height of floor rack, max., 0 ft. 6 in.; clearance under floor rack slats, min., 0 ft. 4¾ in.; capacity of ice bunkers (263 cu. ft.), nominal, 10,000 lb.; width of side door opening, min., 4 ft. 0 in.; height of side door opening, min. 6 ft. 6 in.; height from rail to floor, minimum, 4 ft. 2 in., maximum, 4 ft. 4 in.; centerplate height, 25¾ in.

5—*Car Structure*—To be of steel-sheathed, wood-lined type, following as closely as practicable the A.A.R. steel-sheathed box-car design, with alternate consisting of steel super-structure framing with wood sheathing and wood lining. Underframe of same design and of same length and width as for the 1932 A.A.R. steel-sheathed box car.

6—*End Construction*—To be of steel, design and application corresponding to the A.A.R. standard steel-sheathed box car and to meet necessary strength requirements.

7—*Roof*—To be of the solid steel type with a heavier sheet around the hatch openings.

8—*Side Doors*—Conventional hinged two-piece plug type.

9—*Insulation*—Side and ends, 3 in.; floor and roof, 3½ in. Based on the use of insulation material having a thermal conductivity not to exceed 6.24 B. t. u. per inch of thickness per square foot per deg. F. difference in temperature for a 24 hour period. Insulation should preferably be applied in blanket form with suitable backing and applied in continuous blankets extending from door post to corner post or around the end to opposite door post, in the floor between the side sills and end sills and on the roof between side plates and hatch openings.

10—*Floor*—Floor to be thoroughly waterproofed with waterproofing extended to the height of floor-rack hinge bolts.

11—*Floor Racks*—To be of hinged sectional type.

12—*Ice Bunkers and Bulkheads*—Ice bunkers and bulkheads to be stationary and of the conventional basket type, with an insulated lining on the side of bulkhead toward lading. Provision for stage icing optional.

13—*Well Traps*—Should be designed to permit of easy access for cleaning and to have cover arranged to form water seal and must be of ample capacity for maximum meltage of ice. Drain tubes should be located to avoid dripping on journal box.

14—*Hatch Openings and Frames*—To be the present A. A. R. standard, except that the fillet in corners of hatch openings should have a radius of 1½ in., with hatch plugs and covers of detachable hinged type. Ice hatches to be beveled at bottom to facilitate full icing at center of bunkers.

15—*Threshold Plates*—Should be raised sufficiently, or other provision made to divert the flow of water, caused by melting ice, away from the threshold plate and thereby prevent seepage under door. Consideration must also be given to the proper breaking of heat flow through the threshold plate.

16—*Body Center Plates*—Drop forged to A. A. R. dimensions. Top and bottom bearing surfaces to be smooth, true and parallel

17—*Draft Gears*—Friction type of capacity meeting A. A. R. specifications and to fit 24⅝ in. pocket.

18—*Couplers*—A. A. R. Type E with 6¼ in. by 8 in. shank, bottom operated. See Plate D for alternates.

19—*Uncoupling Arrangements*—Rotary bottom operated from one side at each end of car, with malleable-iron, cast-steel or forged-steel brackets. See Plate D covering alternates.

20—*Striking Casting*—Cast steel with separable coupler carrier. See Plate D for alternates.

21—*Safety Appliances*—To conform with the latest Interstate Commerce Commission and A. A. R. requirements.

22—*Air Brakes*—AB freight car brake equipment. Brake pipes to be the standard for brake equipment and to have smooth edges free from fins and burrs. A thin coat of graphite grease shall be applied to male threads only and care shall be taken to keep the grease from the inside of pipe and fittings. Connections shall be tested under not less than 70 lb. gage pressure, using soap suds to determine leaks. The completed brake installation shall be finally tested to determine that it operates properly and that there are no interferences. A metal plate showing brake-lever dimensions is to be applied in a visible location near air-brake markings. See Plate D covering alternates.

23—*Hand Brake*—Geared type meeting A. A. R. and I. C. C. requirements.

24—*Trucks*—To conform to the limiting dimensions shown on Plate 60 and A. A. R. specifications for strength requirements. Wheels, axles, journal boxes and contained parts to be in accordance with A. A. R. standards. See Plate D for alternates. The use of non-harmonic truck spring arrangement is recommended for all new refrigerator cars.

25—*Painting*—The purchaser shall furnish the builder all necessary information relating to paint, marking, lettering and stamping desired, in addition to that covered by A. A. R. requirements. All metal parts shall be free from scale and rust and thoroughly cleaned before they are painted. All metal in contact with wood or metal and where not accessible after assembly must be covered with one coat of approved paint before assembling. Both sides of all-steel roofs, outside and inside of superstructure, underframes and trucks (except wheels, axles and parts contained in journal boxes), to be painted in accordance with requirements of the purchaser.

Report of Joint Sub-Committee on Side Frames and Bolsters

During the past year new designs of cast-steel side-frames successfully passed both static and dynamic tests, or slightly modified designs of side frames, already tested and approved,

were approved for use in interchange service to the number of 16. These included two alloy-steel and four carbon-steel 40-ton spring-plankless designs, seven alloy-steel and two carbon-steel 50-ton spring-plankless designs, and one alloy-steel 70-ton design with spring planks. There were 13 new bolster designs which successfully passed static tests or slightly modified designs previously tested which were approved, including two alloy-steel and four carbon-steel 40-ton spring-plankless types, six alloy-steel 50-ton spring-plankless types, and one alloy-steel design for a 70-ton spring-plankless truck. The designs include the Barber stabilized trucks and self-aligning trucks.

Reference was made in the 1937 Report of Car Construction Committee to the new designs of pressed and welded rolled-steel frame and bolster for 50-ton capacity cars submitted for approval by the United States Steel Corporation. The bolster which successfully passed static tests conducted by the sub-committee was approved for use in interchange service to the extent of 50 car sets as referred to in the above mentioned report and was later increased to a maximum of 1000 car sets. The pressed and welded rolled-steel side frames successfully passed static test conducted by the joint sub-committee but as this frame has not yet passed the required dynamic test, approval has been withheld. Other applications pending include side frames for a 40-ton and a 70-ton truck, each spring-plankless and of carbon steel, and one 50-ton alloy-steel design for a truck with spring plank.

In the list of side-frame and bolster designs approved is included the Simplex truck manufactured by the American Steel Foundries who were given authority March 25, 1936, to furnish not to exceed a total of 562 car sets of 40-, 50-, or 70-ton capacity for experimental applications and the National Type C truck manufactured by the National Malleable and Steel Castings Company who were authorized Sept. 11, 1936, to furnish not to exceed 50 car sets of either 40-, or 50-ton capacity for experimental application. The list also includes 40-ton capacity, Grade B, carbon-steel quick-wheel-change trucks submitted by the Four-Wheel Truck Association which has been approved for experimental application to two John Morrell & Company and two Armour Car Line Cars. Included is also a spring-plankless cast-steel side frame made from Grade B carbon steel submitted by the Unit Truck Corporation for approval for application to not more than 50 cars in interchange. This frame embodies a new departure in truck construction including a special type of one-piece brake beam engaging in a guide cast integral at the lower inside edge at truck side frame, thus doing away with the conventional brake-beam hangers and brackets.

Proposed Restrictions in Interchange of Older Types of Truck Side Frames

At a regular meeting of the Committee on Car Construction, recommendations were made to modify Interchange Rule 23 covering autogenous welding limits and regulations to prohibit welding of cracks and fractures and building up of worn surfaces on L- and T-section cast-steel side frames. Subsequently the General Committee concurred in this recommendation and in addition thereto, recommended the revision of Rule 3 Section (t) and of Rule 19 to prohibit the application of welded L- and T-section side frames to all cars in interchange, and this is to be included in the Arbitration Committee's report this year.

Ultimate Results

Although the above is a step in the right direction and should produce good effects, ultimate results will depend almost entirely on the extent to which the member roads interest themselves in the elimination from service of questionable side frames, irrespective of design, age or section, which obviously should not be continued in service. Some railroads have found it very desirable to institute reports of all defective cast-steel side frames found on system cars, with a view to discovering the patterns giving the most trouble and putting in force such rules as are necessary properly to safeguard operation.

About five years ago, one large road instituted a means of close control over this matter by the following procedure:

Monthly reports are made of all cast-steel side frames removed from service account defects as found on inspection of cars appearing in shops or on repair tracks. These reports are made from each point regardless of whether or not defective frames are found. In addition, separate investigations are made of each frame failure in service, the results of which are recorded and reported with complete information as to the location and character of the failure, type, pattern number, and marking on the frame, from which its age and history can be checked.

From the above reports records of performance of each frame pattern are maintained. When this performance becomes unsatisfactory, as gaged from total number in service, percentage of removals for defects, number of failures in service causing derailments and train delays, age and design, the frame is designated for scrapping outright, regardless of the condition of the others, when cars so equipped are retired. If it is desired further to expedite removals from service, frames so designated are scrapped when removed from cars appearing on repair tracks.

The general side-frame situation with respect to the above conditions, also number of serviceable frames in stock and replacement frames required, is reviewed jointly every six months by the purchasing, stores, maintenance and engineering departments for the purpose of making revisions as necessary or desirable in the written instructions which are maintained in the hands of all concerned.

All other cast-steel side frames, regardless of design, age or section, when removed for any purpose, are subjected to thorough cleaning and careful inspection and if found in serviceable condition are placed in stock for further use; otherwise they are immediately scrapped.

Further Recommendations

It is the recommendation of your committee that, through proper A. A. R. channels, the need for a definite and systematic procedure, equivalent to the above, be brought to the attention of the member roads and private car owners, and then followed up with them as may be judged desirable or necessary.

Definitions and Designating Letters for Freight and Passenger Cars

During the past year the committee has passed upon a large number of requests from the members for designating letters for new types of passenger and freight cars. When such requests are received your sub-committee first reviews them, and in cases where it is found that designating letters already in the Manual cover the cars in question, the car owner is so notified by the secretary. A large number of such cases have been so handled this past year.

The committee recommends the following:

Changing of the definition PC to read:

"PC—Passenger, Parlor, or Chair Car. A car fitted with individual or movable chairs and having toilet and washroom facilities. May be equipped with bar. Sometimes provided with barber shop and bath."

The addition to the Manual of the designation *"LC—A house car with side doors and roof hatches. May be equipped with end doors."*

The committee has also passed favorably upon a number of cases of modifications of definitions of designating letters now in the Manual. The object of these suggested changes is to simplify the Manual and eliminate some of the designations which are superfluous. These latter recommendations are being reviewed by other interested divisions of the Association and will, at a later date, be submitted to the members for approval by letter ballot.

Interchange Rule 3 on New Designs of Freight Cars

During the current year the committee reviewed the following designs with trucks in accordance with the provisions of the first paragraph of Interchange Rule 3:

Light-weight steel-sheathed automobile car 50 ft. 6 in. long, with special design of underframe; 700 cars. Light-weight steel-sheathed box car 40 ft. 6 in. long, with special design of underframe; 1900 cars. Both for the Union Pacific; both approved.

70-ton side-dump hopper cars of copper-bearing steel for the Elgin, Joliet & Eastern. Center sills consist of two 13-in. 40-lb. channels with ⅜-in. by 21-in. cover plate.

American Car and Foundry Company underframes, anchorage and car structure parts for transportation of 15 one-ton chlorine containers each. Designs (2) approved; 9 cars.

Pullman-Standard Car Manufacturing Co. light-weight steel-

sheathed box car 40 ft. 6 in. long. Special all-welded design; 200 cars.

Journal Boxes and Details

The annual report for 1937 contained certain recommended changes in the width of the opening at the back end of the box as given in the table on Page 32 of D. V.-920.

Following a conference with the side-frame manufacturers, it now develops that minor corrections in some of these dimensions are considered necessary to prevent, under extreme worn conditions, the distortion of the back opening in the box and the possible crushing of the dust-guard sides.

The following table shows the proposed changes to provide uniform clearance between the axle and the inner opening of the box for all sizes of journals, also the width dimension of the back wall opening restored to the standard prior to 1937:

	Back wall opening			Inner wall opening		
Journal size	Std. prior to 1937	Adopted 1937	Proposed	Std. prior to 1937	Adopted 1937	Proposed
5 in. by 9 in. ...	7½ in.	7 in.	7½ in.	6¾ in.	7 in.	7 in.
5½ in. by 10 in..	8 in.	7¾ in.	8 in.	7⅜ in.	7¾ in.	7½ in.
6 in. by 11 in. ..	8¾ in.	8¾ in.	8¾ in.	8 in.	8¾ in.	8⅛ in.
6½ in. by 12 in..	9¼ in.	9¼ in.	9¼ in.	8½ in.	9¼ in.	8⅝ in.

It is recommended that these changes, which will provide sufficient clearance at the inner axle opening of the box with a minimum amount of change in patterns, be submitted to letter ballot. If approved, the drawings in the Manual and Supplement to the Manual will be revised accordingly.

Other Items

The committee called attention to the fact that the final report of the Impact and Live-Load Tests of Pullman-Standard Welded Box Car No. 501 has been completed, and that the secretary has been instructed to circulate it to all voting members as well as to the A. R. C. I.

Changes desired in the A. R. E. A. clearance diagram marked "Unrestricted for Main Lines" were made and approved by the A. R. E. A. at its last annual meeting and will be incorporated in its Manual as Fig. 10. This will also be included in the Supplement to the Mechanical Division Manual in addition to Plate B for "Unrestricted Interchange Operation" which is to be retained.

A sub-committee has been appointed to check the lettering and marking for auto rack cars with the members for the purpose of determining whether a changed system of classification which can be kept up to date more conveniently is not desirable.

The joint sub-committee to consider the adjustment of rail-load limit capacity to compensate for various weight wheels now in general use proposes the addition of a note to Interchange Rule 86 to compensate for the average difference in weights. This has been approved by the Arbitration Committee and will be considered by the Car Construction Committee at its next meeting.

The report was signed by P. W. Kiefer (chairman), chief engineer motive power and rolling stock, New York Central; T. P. Irving (vice-chairman), engineer car construction, Chesapeake & Ohio; W. A. Newman, chief mechanical engineer, Canadian Pacific; J. McMullen, superintendent car department, Erie; F. A. Isaacson, engineer car construction, Atchison, Topeka & Santa Fe; G. S. Goodwin, assistant to general superintendent motive power, Chicago, Rock Island & Pacific; H. L. Holland, assistant engineer, Baltimore & Ohio; E. B. Dailey, engineer car construction, Southern Pacific; J. T. Soderberg, general foreman, Pennsylvania; T. M. Cannon, engineer car construction, Chicago, Milwaukee, St. Paul & Pacific; H. E. Myers, master car builder, Lehigh Valley, and F. J. Jumper, general mechanical engineer, Union Pacific.

The report was approved and recommendations of the committee ordered submitted to letter ballot.

Revision of postal-car specification originated with a communication received by the secretary early in 1937 from the Second Assistant Post Master General suggesting review of specifications for postal cars with particular reference to cars and appartments of lightweight high-speed trains being placed in service. The annual report for this year from the mechanical engineer of the Mechanical Division is to contain a report on the development and status of this subject.

Report on Wheels

It has been suggested to the committee that tape sizes for cast-iron wheels be defined as 1/16 in. rather than ⅛ in. circumferential dimension in order that in the selection of wheels for physical tests, should the wheels of one designated tape size fail, advantage could be taken of the next tape dimension. This would provide for test groups to vary by one-half tape instead of full tape size.

The ⅛-in. tape dimension has been so long established and so generally recognized as a unit of wheel circumference measure that the committee does not approve changing the unit tape size of ⅛ in., but is agreeable to revising the section of the cast-iron wheel Specification M-403-36 so that advantage can be taken of half tape sizes in the selection of wheels for physical tests.

It is also recommended that in each of the paragraphs under consideration for revision that the words "and cast date" be added.

Out-of-Round Tolerances—New Cast-Iron Wheels

Consideration has been given to the question of reducing the out-of-round tolerance on new cast-iron wheels. The committee realizes the extent to which damage to equipment and lading occurs from out-of-round condition of wheels, but is not in position to make a recommendation at this time. Advice has come to the committee that certain roads are purchasing and placing in service ground cast-iron wheels and some roads are following the practice of grinding wheels after mounting, which the committee considers is a most desirable practice. Information from roads following these practices as to service results is earnestly solicited.

Your committee has been solicited to establish certain symbols to represent loading capacity of lightweight cast-iron wheels. The committee recognizes there may be some merit to such an arrangement should the lightweight cast-iron wheel be adopted as standard.

Authorization of Use of Experimental Cast-Iron Wheels

In the 1937 report attention was directed to an experimental type 750-lb. 33-in. single-plate cast-iron wheel, the special features of this wheel being the cored hub and brackets supporting the inside of the rim. Authority had been issued the manufacturers to construct as many as 10,000 of these wheels; the same to be identified as experimental design by the mark "AAR-X."

Further development on the part of the Association of Manufacturers of Chilled Car Wheels resulted in the production of a lightweight cast-iron wheel suitable for the same capacity loading as the 750-lb. wheel. This lightweight wheel was to weigh 695 lb. in the rough, 685 lb. finished. Request for the application of 10,000 of this design of wheel carrying with it cancellation of the authority for 10,000 750-lb. wheels, of which a balance of 7,600 remained unapplied, was granted by the General Committee, these wheels to carry the AAR-X experimental wheel marking.

Another request was received for authority to apply 10,000 cored-hub, bracketed-type wheels for mounting on 6-in. by 11-in. axles. Three thousand of these wheels were on order from a member road. In consideration of this request authority was granted for the 3,000 wheels on order, the subject being left open for consideration should additional groups of wheels of this capacity be requested by member roads.

In connection with these lightweight experimental cast-iron wheels, the committee feels that a careful study should be made of two conditions, relating to this design, namely, the effect the cored hub may have upon the finished machining of the bore of the wheel and the effect this partially unsupported wheel fit may have upon the concentration of stresses in the axle. Roads obtaining these cored-hub wheels should give careful consideration to the former item, and the Association of Manufacturers of Chilled Car Wheels should arrange to make a study of the latter, relating to axle stresses.

Chipping Customer's Initials Off Wheels

It has been the practice on the part of cast-iron wheel manufacturers to supply the demand for small groups of wheels

from stock produced for larger customers by chipping the customer's initials from such wheels. While there is only an occasional demand on the part of the manufacturers that requires such action, the committee recommends that this practice be prohibited and when the manufacturer is required to supply wheels under the above mentioned condition that authority be requested of the railroad from whose stock these wheels are to be taken, permitting the railroad's initials to remain on the wheels and reporting to the road for whom they were manufactured the serial numbers of wheels included in such an allotment.

The Association of Manufacturers of Chilled Car Wheels has been doing some splendid research work in an effort to develop a definite and practical means of determining the depth of chill, proceeding along the line of hardness as an index to the character and depth of chill. It has also been demonstrated that the inspectors trained in the art of determining the character of chill in the wheel can very closely approximate in their determinations the results of the hardness test. This study is being continued on the part of the manufacturers and probably by the time another annual report is prepared some more detailed data will be available.

A joint committee selected from membership of the Engineering and Mechanical Divisions has been appointed to make a study as to the relationship between track and rolling stock. The representative on this joint committee from the Wheel Committee reports that one meeting has been held, but no definite program formulated. It is understood that this work is to be carried forward under the chairmanship of Dr. A. N. Talbot of the University of Illinois.

The subject of out-of-roundness has already been mentioned in connection with cast-iron wheel subjects, and it is no less important with respect to wrought-steel wheels as the same degree of out-of-roundness is just as destructive, regardless of the material of which the wheel is made.

In a conference with representatives of the wrought-steel wheel industry the suggestion was made to them that consideration be given to the practicability of reducing the out-of-round tolerance for one-wear and two-wear wrought-steel wheels from the present maximum of 1/32 in.

Design of Wheels for Streamline Trains

Your committee has been endeavoring to accumulate some definite data with the idea of determining the characteristics of car wheels best adapted to high-speed lightweight streamline trains. There is not sufficient data available to support any definite recommendations, but it may be of interest to know just what the tendencies in this service indicate.

The service mileage of wheels in this class of service is much lower than considered normal for ordinary passenger-car wheels. The performance of wheels indicates that in this particular class of service a special type of wheel must be provided if reasonable mileage is to be secured. It is hoped that your committee, in collaboration with the manufacturers, may, during the coming year, be able to suggest a specification for wheels for such high duty service.

In the study of wheel service it appears the question of braking conditions on these high-speed trains is a matter of worth while consideration by the Brake Committee in an effort to relieve as far as possible the punishment the wheels receive as a result of heavy braking.

In several former reports of the committee reference has been made to the loss of service metal in passenger-car wrought-steel wheels due to development of thermal checks, resulting from severe braking. On certain railroads in some classes of service this trouble is still prevalent. On certain other railroads where special types of wheels have been used to overcome the trouble, it appears to have been largely eliminated. The experience on these latter railroads seems to indicate that where service conditions are such as to make necessary a special type of wheel to resist thermal checking, the best solution is to use wheels with a lower carbon content in the steel and then heat treat to obtain the desired physical properties. The committee does not consider that a special specification is necessary to cover this product at the present time as its use may not be necessary in more than a limited number of special services. Where unusual difficulties of this kind are encountered the committee suggests a trial of special wheels of the above mentioned type which can be secured from any of the manufacturers of wrought-steel wheels.

Wheel Service Records

Appended to the 1937 report of this committee were certain service records reported by three member roads showing the cause for which wheels were removed on these roads during three winter months. In presenting this portion of the report your committee stated it was the intention to supplement this record with a similar record of three summer months in a subsequent report. The roads supplying this information are the same roads included in last year's report and are similarly designated as Roads A, B and C. The arrangement of the data is substantially the same, except that two roads showed the results of removals of multiple-wear and one-wear wrought-steel wheels separately, whereas in last year's report the record of all wrought-steel wheels was combined.

[The report included four tabular exhibits submitted by Road A, two by Road B and two by Road C. For lack of space, the Road A exhibits, only, are included in this abstract of the committee's report.—Editor.]

Table I—Summary of Causes of Cast-Iron Wheel Removals from Foreign Cars on Road A During July, August and September, 1937

Wheels Condemned by Standard Gage

Symbols	Cause of removal	Removed: Single plate	Removed: Double plate	Per cent: Single plate	Per cent: Double plate	Total removed	Per cent
73	Worn through chill	1,611	1,021	20.71	15.96	2,632	18.58
72	Seams	768	1,685	9.87	26.37	2,453	17.32
75	Brake burn, cracks	1,859	429	23.90	6.71	2,288	16.15
78-R	Broken rim	749	1,433	9.63	22.43	2,182	15.40
68	Slid flat	695	157	8.94	2.46	852	6.02
73-R	Out of round	491	276	6.31	4.32	767	5.41
75-C	Brake burn, comby	503	196	6.47	3.07	699	4.93
78	Flange, chipped	363	148	4.67	2.32	511	3.61
71	Shelled out	225	160	2.89	2.51	385	2.72
74-V	Flange, vertical	69	242	0.89	3.79	311	2.20
74-T	Flange, worn thin	80	208	1.03	3.26	288	2.03
81-L	Loose wheel	135	88	1.73	1.38	223	1.57
83	Weight less than 650, 700 and 750 lb.	2	155	0.03	2.43	157	1.11
76	Tread worn hollow	66	84	0.85	1.32	150	1.06
78-F	Flange, cracked or broken	81	40	1.04	0.63	121	0.85
71-F	Flat, comby	62	22	0.80	0.34	84	0.59
78-P	Plate, cracked or broken	2	29	0.03	0.45	31	0.22
107	Built up tread	16	4	0.20	0.06	20	0.14
98	Large bore	1	5	0.01	0.08	6	0.04
98-W	No weight cast on wheel	..	4	..	0.06	4	0.03
77	Burst hub	..	3	..	0.05	3	0.02
	Total	7,778	6,389	100.00	100.00	14,167	100.00

Wheels Condemned by Remount Gage

82-W	Tread worn hollow	1,162	1,118	56.14	64.44	2,280	59.92
82	Brake burn, cracks	465	168	22.46	9.68	633	16.64
82-V	Flange, vertical	163	148	7.87	8.53	311	8.17
82-C	Brake burn, comby	182	87	8.79	5.01	269	7.07
82-T	Flange, thing	20	127	0.97	7.32	147	3.86
82-S	Shelled out	68	74	3.29	4.27	142	3.73
82-H	Flange, high	10	13	0.48	0.75	23	0.61
	Total	2,070	1,735	100.00	100.00	3,805	100.00

Defective Axles

Symbols	Cause of removal	Number defective removed	Per cent defective
84	Cut or burnt journal	3,103	96.25
85-C	Long journal	56	1.74
86	Small journal diameter	33	1.02
84-A	Bent axle	14	0.44
86-B	Low center diameter	5	0.16
86-A	Low wheel seat	4	0.12
85-A	Seamy journal	4	0.12
85-D	Broken or worn collar	3	0.09
85	Broken journal	2	0.06
	Total	3,224	100.00

Grand Total

	Second-hand	Defective	Total	Per cent defective
Single-plate wheels	6,827	9,848	16,675	59.06
Double-plate wheels	2,657	8,124	10,781	75.35
Total wheels	9,484	17,972	27,456	65.46
Axles	10,504	3,224	13,728	23.48

On Road A the principal causes for removal of cast-iron wheels was worn-through chill, seams, brake burn cracks and broken rim. The percentage of the total number of wheels removed for these causes ranges from 18.58 per cent for worn-through chill, to 15.40 per cent on account of broken rim.

The principal cause for the removal of multiple-wear wheels on this same road was thin flange, 67.32 per cent having been removed for this cause, while for the one-wear wrought-steel wheels the principal cause of removal was built-up tread, 46.42 per cent, with an appreciable percentage for loose wheels and thin flange.

The most prominent causes for cast-steel wheel removals was shelled-tread and thin flange, 29.73 per cent having been removed for each one of these defects.

On Road B 32.8 per cent of the cast-iron wheels were removed on account of broken rim. The next condition in line of defects was 22.37 per cent removed on account of flat sliding. Of the wrought-steel wheels removed on this road 51.73 per cent were removed for thin flange, 23.87 per cent for high flange or tread-worn hollow. This item of 23.87 per cent represents a favorable condition as it indicates this group of wheels had been subjected to the maximum amount of tread wear.

On Road C, three prominent causes for removal of cast-iron wheels were, worn-through chill, broken rim and seams, these representing 32.53 per cent, 21.58 per cent and 13.22 per cent, respectively. On this same road the wrought-steel wheel removals were 38.10 per cent for worn flange, and 28.57 per cent for slid flat. It will be observed, however, that the number of wrought-steel wheels involved in making up these percentages is rather limited, and therefore does not represent much value from a service-record standpoint as where a greater number of wheels are involved.

Table II — Summary of Causes of Multiple-Wear Wrought Steel Wheels Removed from Foreign Cars on Road A During July, August and September, 1937

WHEELS CONDEMNED BY STANDARD GAGE

Symbol number	Cause of removal	Number removed	Per cent
74-T	Flange worn thin	894	67.32
79	Thin rim	152	11.44
81-L	Loose wheel	103	7.75
107	Built up tread	92	6.92
68	Slid flat	66	4.97
71-E	Shelled tread (Less than 3/8 in.)	5	.38
76 (HF)	Flange, high	4	.30
74-V	Flange, vertical	3	.23
71-B	Rim, shattered	2	.15
71-D	Sub-surface defect	2	.15
76 (TWH)	Tread worn hollow	2	.15
71-A	Rim, burnt	1	.08
71-S	Shelled tread (3/8 in. or over)	1	.08
80-B	Plate, circumferential crack in	1	.08
	Total	1,328	100.00

DEFECTIVE AXLES

84	Cut or burnt journal	2,004	99.11
85-C	Long journal	10	.49
86	Small journal diameter	3	.15
84-A	Bent axle	2	.10
85-A	Seamy journal	1	.05
85	Broken journal	1	.05
85-D	Broken collar	1	.05
	Total	2,022	100.00

GRAND TOTAL

	Second-hand	Defective	Total	Per cent defective
M. W. wrought-steel wheels	4,450	1,328	5,778	22.98
Axles	867	2,022	2,889	69.99

Table III — Summary of Causes of One-Wear Wrought-Steel Wheels Removed from Foreign Cars on Road A During July, August and September, 1937

WHEELS CONDEMNED BY STANDARD GAGE

Symbol number	Cause of removal	Number removed	Per cent
107	Built up tread	26	46.42
81-L	Loose wheel	11	19.64
74-T	Flange, worn thin	10	17.85
68	Slid flat	4	7.14
71-B	Rim, shattered	1	1.79
71-C	Rim, spread	1	1.79
74-V	Flange, vertical	1	1.79
77	Burst hub	1	1.79
79	Thin rim	1	1.79
	Total	56	100.00

WHEELS CONDEMNED BY REMOUNT GAGE

82-T	Thin flange	2	100.00
	Total	2	100.00

DEFECTIVE AXLES

84	Cut or burnt journal	194	100.00
	Total	194	100.00

GRAND TOTAL

	Second-hand	Defective	Total	Per cent defective
One-wear wrought-steel wheels	404	58	462	12.55
Axles	37	194	231	83.98

Table IV — Summary of Causes of Cast-Steel Wheel Removals from Foreign Cars on Road A During July, August and September 1937

WHEELS CONDEMNED BY STANDARD GAGE

Symbol number	Cause of removal	Number removed	Per cent
71	Shelled out	22	29.73
74-T	Flange, worn thin	22	29.73
78-P	Plate, cracked or broken	11	14.87
81-L	Loose wheel	7	9.46
76	Tread worn hollow	4	5.41
74-V	Flange, vertical	3	4.05
78-R	Broken rim	2	2.70
72	Seams	1	1.35
73-R	Out of round	1	1.35
78-B	Bracket cracked or broken	1	1.35
	Total	74	100.00

WHEELS CONDEMNED BY REMOUNT GAGE

82-T	Thin flange	7	53.85
82-V	Vertical flange	4	30.77
82-S	Shelled out	2	15.38
	Total	13	100.00

DEFECTIVE AXLES

84	Cut or burnt journal	88	95.65
85-A	Seamy journal	2	2.17
86	Small journal diameter	1	1.09
84-C	Pitted journal	1	1.09
	Total	92	100.00

GRAND TOTAL

	Second-hand	Defective	Total	Per cent defective
Cast-steel wheels	201	87	288	30.21
Axles	52	92	144	63.89

Revision of Wheel and Axle Manual

In the revision of the Wheel and Axle Manual there are so many pages in which changes are involved that it was decided to reprint the manual, and it is hoped before the year is over the association will be in position to authorize this action being taken.

Observation of wheel-shop practices, as evidenced by wheels coming into the shops of committee members, indicates the need for more refined workmanship, and it is urged that member roads take occasion to look into the manner in which wheel and axle work is being performed.

The committee wishes to take this means of expressing its appreciation of the splendid co-operation it is receiving from the representative wheel manufacturing interests. The committee feels we are now in the midst of a period of wheel development brought about by the endeavor on the part of the manufacturers to meet various exacting service conditions, and realizing the importance of service demonstrations, solicits the patronage of the railroads so that opportunity may be afforded the manufacturers for developing the merits of their improved products.

Summary of Recommendations

Revision of Cast-Iron Wheel Specifications—It is recommended that the specifications for cast-iron wheels, M-403-36, be revised by inserting the underscored words *"full or half"*

tape size *"and cast date,"* in paragraphs 5 (c), 6 (a), 7 (a), 8 and 11 (b).

It is recommended that the dimensions referred to in Sec. 4 (b), Dimensions—second sentence be changed to read: *"¼ in. above or 5/16 in. below."*

After the second sentence in Sec. 4 (c), Taping, insert *"A tape size is considered that of the lower gradation until the next higher gradation is reached."*

Par. 5 (b)—Drop Test—Change the word *"on"* a concrete foundation to *"or"* a concrete foundation.

Master Gages—In the design and development of master gages for condemning worn condition of gages used in connection with wheels it was necessary to establish a dimension to represent the result of wear beyond which dimension the gage would be condemned. Dimension 0.015 in. which corresponds to 1/64 in. was established as a basis for the development of these master gages.

The gages developed for this purpose are shown as Figs. 35 to 42 inclusive, and are presented for approval of the association. [Note: In order to avoid expense, prints of the gages referred to were omitted from this report. Cuts will be made for the Letter Ballot Circular.]

Symbols.—It is recommended that defect symbol 83-A be adopted to represent "Cast-Iron Wheels cast prior to January 1, 1921" (Rule 83).

Recommendations to Arbitration Committee with Reference to Changes in Interchange Rules

Rule 76—Tread Worn Hollow—Where the tread-worn hollow defect refers to cast-iron wheels, insert *"One Wear"* before cast-steel wheels.

Where the tread-worn hollow defect refers to wrought-steel wheels, after wrought-steel insert *"and Multiple-Wear Cast-Steel Wheels."*

If the aforegoing recommendation is approved, similar change should be made in P. C. Rule 7, Sec. (f), Par. 4, and the title under Fig. 91, page 126 of the Wheel and Axle Manual should be changed to read: *"Tread Worn Hollow Condemning Limit Gage for Cast-Iron and One-Wear Cast-Steel Wheels."*

Rule 75—Brake Burn Cracks—Insert a note establishing a definite dimensional limit for transverse cracks approaching the flange of the wheel.

A similar note should be added to P. C. Rule 7, Sec. (f), Par. 3.

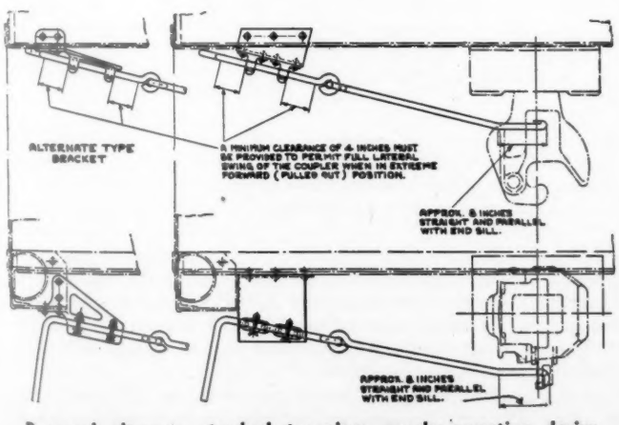
Rule 73-A, Out-of-Round—Revise by inserting "One-Wear" before cast-steel and "One-Wear" before wrought-steel wheel references.

If the above recommendation is approved, the title under Fig. 76-A, Page 116 of Wheel and Axle Manual should be changed to read: "Gage for Out-of-Round Cast-Iron, One-Wear Wrought- and One-Wear Cast-Steel Wheels."

Rule 82, Broken Rim—It has been recommended that Rule 82 be amplified by the addition of Par. (d) in Rule 82, establishing a remount limit for broken rim.

The report was submitted by Chairman H. W. Coddington, chief chemical and test engineer, Norfolk & Western, Roanoke, Va.; Vice-chairman D. Wood, engineer of tests, Southern Pacific, San Francisco, Cal.; H. H. Haupt, general superintendent motive power, Pennsylvania, Pittsburgh, Pa.; E. E. Chapman, mechanical assistant, Atchison, Topeka & Santa Fe, Chicago; J. Matthes, chief car inspector, Wabash, Decatur, Ill.; A. G. Hoppe, assistant mechanical engineer, Chicago, Milwaukee, St. Paul & Pacific, Milwaukee, Wis.; A. M. Johnsen, engineer of tests, Pullman Company, Chicago; E. C. Hardy, assistant engineer, New York Central, New York; W. R. Hedeman, engineer of tests, Baltimore & Ohio, Baltimore, Md.

(*The report was approved and recommendations ordered submitted to letter ballot. The committee was directed to give serious consideration to reducing the limit of wear of wheels used in high-speed service and to work with the manufacturers in developing the most satisfactory wheel for ultra high-speed service.*)

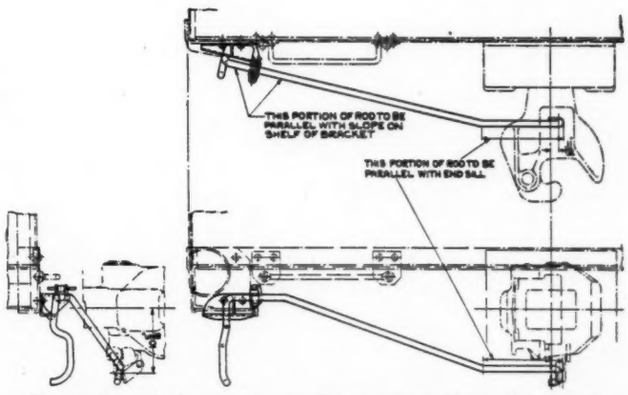

ALTERNATE TYPE BRACKET
A MINIMUM CLEARANCE OF 4 INCHES MUST BE PROVIDED TO PERMIT FULL LATERAL SWING OF THE COUPLER WHEN IN EXTREME FORWARD (PULLED OUT) POSITION.
APPROX. 6 INCHES STRAIGHT AND PARALLEL WITH END SILL.
APPROX. 6 INCHES STRAIGHT AND PARALLEL WITH END SILL.

Proposed alternate standard two-piece coupler-operating device licensed to A.A.R.

Couplers and Draft Gears

The tight-lock coupler adopted in 1937 as alternate standard to the standard Type E coupler for passenger service, is receiving further attention on the part of the coupler manufacturers in the nature of refinements of finish during manufacture of certain parts of the coupler relating to the contour lines. These refinements are being worked out to improve the fitting and interchangeability of parts as produced by the different coupler manufacturers.

Up to the present time, orders have been placed upon the coupler manufacturers for approximately 1,000 tight-lock couplers. The reports relating to the service obtained from these couplers have been gratifying. The Mechanical Committee of the coupler manufacturers is also working on the development of a standard shank or shanks that may be recommended for use in conjunction with tight-lock couplers in passenger service.



Proposed standard one-piece coupler-operating device with certain patented features

Another item in the process of development for use with tight-lock couplers is that of suitable designs of coupler operating rods.

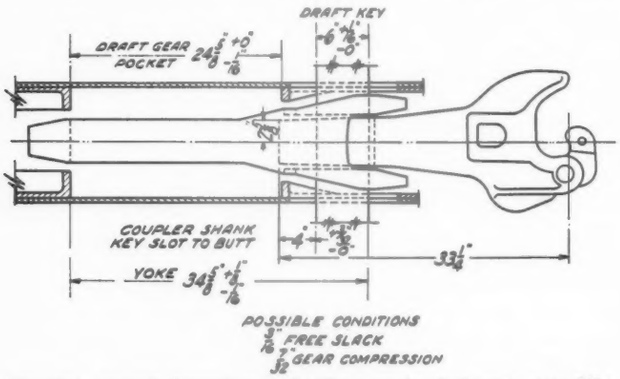
A change has been made in the buffing shoulders of the knuckle and bar in the tight-lock coupler to prevent a worn Type-E knuckle being applied to a tight-lock bar and interfere with its proper operation. This modification was so made that the new tight-lock knuckle will fit the old and new bars, but the old tight-lock knuckle cannot be used in the new bar.

Bottom-Operated Uncoupling Rods for Type E Couplers.—The bottom-operating mechanism of the Type E coupler has been confined to a one-rod type. It has developed that certain features of this bottom-operating rod mechanism are patented, which restricted the source of supply to one manufacturer. The demand for a type of operating mechanism free from any such restrictions has resulted in the development of a two-piece type bottom-operating rod which is comparable in its functioning with the one-piece operating rod.

Both types of operating rods are illustrated. *It is recommended that both types of rods be approved for submission to letter ballot, the one-piece rod to be adopted as standard and the two-piece rod as alternate standard.*

High-Tensile Steel Type E and Tight-Lock Couplers.—Your committee is working with the Mechanical Committee of the coupler manufacturers in the preparation of specifications for tight-lock and Type E couplers in high-tensile steel. When these specifications have been approved by the coupler committee, they will be submitted to the specifications committee for its consideration.

Coupler Shank and Attachment Tolerances.—In the 1937 report of your committee, recommendation was made relating to the revision of manufacturing tolerances of coupler and draft



Important normal dimensions and tolerances in draft-gear assemblies

gear attachments; this recommendation having been based upon observations made in connection with the derailment of a certain lot of new refrigerator cars in which it appeared that restriction in the horizontal angling of the couplers was occurring due to the influence of draft-gear compression forces against the butt of rigid-shank Type E couplers. The subject was referred back to the committee for further consideration.

In the study of this subject, the committee has reviewed present manufacturing practices for couplers and yokes, especially as regards the involved dimensions and variations and concludes that certain changes in limiting tolerances could be made to good advantage. The normal length of the yoke from the rear draft-gear bearing pad to the front of key slot is 34⅝ in. The range in variation in this dimension for each manufacturer is within reasonable limits, but there exists too great a differential between the products of different manufacturers and varies from —⅛ in. to +¼ in.

In checking the length of coupler shank from the back of the key slot to the end of the shank as furnished by several coupler manufacturers, it is again found that the range in variation for each manufacturer is within reasonable limits, but there exists too great a range in the variation as between manufacturers, varying from —1/16 in. to +3/16 in.

A comparison of the key slot to butt dimension on couplers before the butt surface was ground to suit requirements showed similar wide variations. A review of this condition indicates the importance of improving manufacturing practices so that the limits of variations conform to the standard specified and the committee feels that this should be the first action toward improving present conditions. Dimensions and tolerances in accordance with the committee's proposal will provide a maximum 3/16 in. free slack and a maximum 7/32 in. compression when assemblies are made with combinations of dimensions that will develop the two extremes.

The present A. A. R. standards provide for the coupler shank and width of key, but do not provide tolerances for the length of yoke and the length of gear pockets in the sills. Your committee, therefore, recommends that the following tolerances be submitted to letter ballot for adoption as standard:

(1) No change in present standard tolerance governing the length of the coupler shank from the back of the key slot to the end of the shank.

(2) No change in the present tolerance governing the width of the standard draft key.

(3) That the length of the vertical-plane cast-steel yoke be 34⅝ in. from rear draft-gear pad to the front of the key slot, tolerance —1/16 in. and +⅛ in.

(4) That the length of the standard gear pocket in the car sills be 24⅝ in., tolerance +0 in. and —1/16 in.

(5) That the Mechanical Committee of the coupler manufacturers be requested to develop and submit for approval, a suitable gage for measuring the length of coupler yokes and maintaining the tolerances specified, Item 3, above.

Safe-Lock Couplers.—The committee has had on its docket for some time, a suggestion for a safe-lock coupler that would prevent vertical slip-overs and also serve to support a coupler that was pulled from its attachments in the adjacent car. The design suggested was of such a nature that it would not couple with the standard tight-lock coupler and an effort was made to provide a design of safe-lock coupler that would not change the contour lines sufficiently to prevent its use in conjunction with any recognized standard coupler. This matter is also being given consideration by the coupler manufacturers but to date no satisfactory design has been evolved. While this subject is still being studied it is believed that the situation relating to pulled-out couplers and vertical slip-overs is being materially and effectively remedied by the improvements that are being made in draft gears and draft-gear attachments and the more extended use of 11-in. face knuckles.

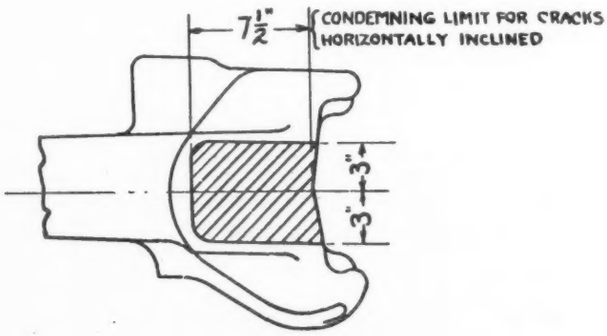
Type E Knuckles Breaking Due to Defective Material.—A few failures have been reported with Type E knuckles breaking in service as a result of defects in manufacture. This matter has been brought to the attention of the coupler manufacturers and an intensive study has been made with the result that considerable constructive information was developed and foundry practices corrected insuring the quality of knuckle castings being maintained to the end that they meet the established strength tests.

Means for Raising Low Couplers.—Your committee has given consideration to recommending some convenient means for maintaining coupler heights in alignment with the draft gears where there is sufficient space between the coupler shank and the striking casting to accommodate the application of a plate between the coupler carrier and bottom of the coupler shank.

Adjustment of coupler height through this means not only brings the coupler in better alignment with the draft gear and attachments, but is an effective means of increasing coupler height, since usually the increase in coupler height is three times the thickness of the shim applied. Recommendation in regard to this subject has been made to the Arbitration Committee together with suggested designs of plates that can be conveniently applied in conforming with this recommendation.

Type D Couplers Opening in Service.—The committee has investigated reports from various railroads that passenger trains were parting where bottom-operated Type D couplers were in use. The investigation disclosed that these partings were principally occasioned by the couplers being equipped with an obsolete design of bottom lock-lift toggle instead of the No. 2 or No. 3 type toggle with the improved anti-creep feature.

On account of the importance of this subject, a circular cover-



Revised Fig. C

ing this condition was prepared and sent out by the secretary as Circular DV-928 dated December 7, 1937. If the suggestions covered in this circular are followed, trouble on account of Type-D bottom operated couplers opening in service due to ineffective anti-creep should be eliminated.

Reclamation of Couplers, Knuckles and Locks.—Present A. A. R. Rule 18, Sec. (a) provides certain limits beyond which a coupler body may be condemned for cracks in the knuckle-tail

side wall, yet still be within limits for reclamation. When such couplers are condemned, the owner is allowed a scrap credit of $1.43 for 6-in. by 8-in. shank Type D coupler body; the coupler body can be reclaimed at a nominal cost in the neighborhood of $2.50 and placed on another foreign car at a second-hand value of $11.76. Questions have also been raised relative to the interpretation of this rule and the limits prescribed in Fig. C. The rule and the limits have received careful consideration by your committee as a result of which the following recommendations are made:

Proposed.—Such crack extends beyond the shaded area, Fig. C, shown on page 56. When crack extends beyond the shaded area, the coupler body is condemned and must not be reclaimed by welding. [Note: Revised Fig. C is illustrated.]

Coupler bodies cracked within the shaded area must have the cracks welded when applied to foreign cars.

If the revision of Rule 18 (a) is approved by the association, Rule 23, Sec. 4, Couplers; Passenger Car Rule 7; and Fig. 5 in the second-hand coupler specifications should be revised to conform thereto.

Cast-Steel Coupler Yokes (Std. Repair Type).—Your committee, in conjunction with the Mechanical Committee of the coupler manufacturers, has made several attempts to design a cast-steel yoke that could be adapted to various draft-gear installations and reduce the number of individual designs the manufacturers are being called upon to supply. Efforts along this line have not been sufficiently satisfying to justify a recommendation. The committee also has under consideration the possibility of using a combination cast-steel head and wrought strap yoke, the head being designed for application with horizontal cross key, and also designed so that the yoke will be secured with short rivets acting in double shear, whereas the same yoke secured to a coupler shank with long rivets would be subjected to single shear.

The study the committee has made of this proposition is not sufficiently advanced to warrant a recommendation at this time.

In conclusion, your committee recognizes the splendid cooperation received throughout the year from the Mechanical Committee of the coupler manufacturers in the advancement of the problems handled by this committee.

The report was presented by Chairman R. L. Kleine, assistant chief motive power, Pennsylvania, Philadelphia, Pa.; Vice-chairman H. W. Coddington, chief chemical and test engineer, Norfolk & Western, Roanoke, Va.; C. J. Scudder, chief motive power, Delaware, Lackawanna & Western, Scranton, Pa.; L. P. Michael, chief mechanical engineer, Chicago & North Western, Chicago; J. P. Morris, mechanical superintendent, Atchison, Topeka & Santa Fe, Ft. Madison, Iowa; H. W. Faus, engineer motive power, New York Central, New York.

Report of Subcommittee on Draft Gears

Two new applications for certificates of approval have been received within the past year. Tests of one of these types are now in progress and the other type will be tested as soon as representative test specimens can be obtained.

During the year, several applications for approval of minor changes in certified gears have been acted upon by the committee. Also, as a result of information uncovered by the annual canvass of the draft-gear manufacturers, several corrections have been made in the records which are on file showing the construction of approved gears.

Steps have been taken to make check tests of the approved draft gears, as provided for in A. A. R. Specifications for Approved Draft Gears, M-901-36, Appendix A, Par. 15. This work is now in progress.

In addition to the work covered by the above projects, the draft-gear testing laboratory has done considerable development work for manufacturers of draft gears and truck springs and has also given some time to perfection of instruments for making draft-gear and truck-spring tests.

At the request of this committee, the Car Construction Committee has made a slight modification in the drawing showing draft-gear carrier used with horizontal yoke, in order to prevent binding of the draft gear under certain conditions in the new Z-section center sill. In this connection closer limits have been set for the external dimensions of approved gears. All draft-gear manufacturers have agreed to be governed by these new limits pending revision of existing specifications which will be deferred for the present in order to save printing expense.

No additional action has been taken on the subject of road tests during the year. It has been continued on the docket because it is felt advisable to make such tests as soon as circumstances warrant.

The subcommittee report was presented by Chairman H. W. Faus, engineer motive power, New York Central, New York; H. W. Coddington, chief chemical and test engineer, Norfolk & Western, Roanoke, Va.; L. H. Schlatter, foreman, Pennsylvania test department, Altoona, Pa., and W. Bohnstengel, assistant engineer of tests, Atchison, Topeka & Santa Fe.

(The report was approved and recommendations ordered submitted to letter ballot.)

Brakes and Brake Equipment

In view of the fact that the size of letters or figures for air-brake markings has been increased from 1 in. to 1½ in., the 3/32-in. bridges now used are too narrow to prevent excessive breakage of stencils. In order to strengthen these stencils and reduce the tendency for breakage, we recommend the adoption of increased width of bridges in stencils to 3/16 in., and that necessary revision be made to figures on pages 118 and 119 of the Interchange Rules and pages E-43 and E-45 of the Manual of Standard and Recommended Practice.

Foreign Substance in Emergency Portion of Type-X AB Brakes

Complaint has been received with reference to various types of plugs used to protect the emergency vent port of the Type AB brake emergency portion when being shipped from shops to various repair points. In some cases common corks have been used and in others metal or wooden plugs covered with rags of various kinds. In applying or removing such plugs, breakage occurs which permits a part of the plug being left in the emergency port and which finds its way under the vent valve, holding this valve off its seat and rendering the valve inoperative.

The air-brake manufacturers, when shipping these parts, close the atmospheric openings with flanged metal thread protectors which are readily removed without possibility of parts being left in the valve structure. This type of plug should be used, or a threaded plug which will screw into the emergency vent port similar to a common pipe plug where the atmospheric opening is threaded, such as applies to all but the earlier types of AB brakes.

We would suggest advising the railroads with reference to this feature, in order that it will not become common practice to resort to plugs of such character that they might inadvertently enter the operating parts either when being applied or removed from the valve openings.

Wasp Excluder for Retaining Valve

The committee has for the past several years endeavored to provide a simple and inexpensive means of protecting the freight retaining valve against stoppage of the exhaust port by mud-bees and wasps. The member roads have tried out two different types of brass plugs having slotted openings. The first type proved unsatisfactory because of being affected by sleet and ice in winter weather. The second type overcame this difficulty but does not provide a large enough dirt compartment so that it will run throughout the ordinary cleaning period for brake equipment without the openings being restricted or closed.

This question has been gone over with the air brake company with a view of re-designing the retaining-valve body so that a larger exhaust opening may be provided which will overcome the inherent faults of the above plug type protectors. This feature is now being developed and if it proves satisfactory, a practical device can be introduced into service through the ordinary renewals of retaining valves.

Brake-Beam Tension-Rod Nuts

The Chicago Railway Equipment Company has developed a sleeve nut which has the seat of the nut chamfered off to provide a seat somewhat in the nature of a ball joint. The sleeve

surrounding the rod and being a part of the nut is about 2¼ in. long, and being a close fit on the rod, keeps the nut in alignment with the rod and causes it to revolve and follow the direction taken by the rod when weaving of the beam occurs for any reason, thus eliminating strain on the rod in the threaded portion. The use of this device does not affect interchangeability of parts and there is no penalty involved for non-use in repairs.

The committee has no objection to the interchange of cars equipped with this new design of tension-rod nut.

Arrangements have been completed for inspecting and testing 100 Pennsylvania and 100 A. T. & S. F. cars equipped with Type AB brakes having new type Westinghouse and New York brake-pipe strainers, which were developed as a result of conditions found upon our last inspection which affected the charging chokes and passages because of rust and foreign matter which was not excluded sufficiently to prevent restricting the rate of normal charging of the brake system.

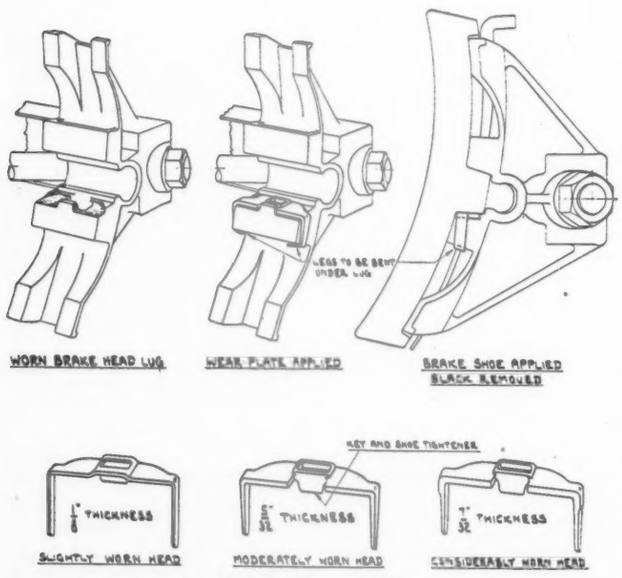
This inspection has not progressed to a conclusion, and report covering our findings will be submitted as soon as all cars are available for this investigation.

Gages for U. C. Protection Valve

In order to prolong the service life of the protection valve in the universal control valve, we recommend changing the dimension of gage No. 37016 from 1.241 in., as shown on page B-80-1935, Manual of Standard and Recommended Practice, to 1.239 in.

Temporary Repairs for Brake-Beam Heads

For the past seven or eight years, various member railroads have used a wear plate of the type shown in the accompanying drawing when the distance between the upper and lower brake-shoe lugs of the brake-beam head measure 2¼ in. or more at the face of the head and the head otherwise meets the A. A. R. requirements at the time periodical repairs to air brakes are made, or when cars are found in train yards with brake-head wear as described.



Brake head wear plate

Many thousands of these plates have been applied to restore the lug openings to their original measurements and to provide for tightly securing the brake shoe in the brake head. These plates have rendered satisfactory service, and the approval of their general use would avoid the expense involved in removing brake beams from cars and sending them to repair shops or reclamation points for reconditioning.

We would recommend that cars carrying brake beams equipped with a device as shown in the accompanying drawing and titled "Brake-Head Wear Plate" be accepted in interchange so long as the application of such wear plate provides for reducing the opening between the brake-shoe lugs to less than 2¼ in.

Other Subjects Under Consideration

The following subjects are also being actively considered by the committee: Gages for remounted couplings, test codes for single-car test devices, standardization of No. 3 brake beam, brake-beam gages, power brakes for ultra-high-speed trains, lightweight brake beams for lightweight cars, braking ratio for passenger cars and locomotives, maintenance and inspection of brake beams and attachments, copper tubing and brass fittings for air-brake lines, and procedure for cleaning and testing Type AB brakes on repair tracks.

The report was signed by Chairman G. H. Wood, supervisor air brakes, Atchison, Topeka & Santa Fe, Topeka, Kan.; Vice-chairman W. H. Clegg, chief inspector air brake and car heating equipment, Canadian National, Montreal, Que.; T. L. Burton, air-brake engineer, New York Central, New York; R. J. Watters, general air-brake inspector, Northern Pacific, St. Paul, Minn.; C. H. Rawlings, general air-brake instructor, Denver & Rio Grande Western, Denver, Colo.; M. A. Kinney, general master mechanic, Chesapeake & Ohio, Columbus, Ohio; R. C. Burns, general foreman, Pennsylvania, Philadelphia, Pa.; L. S. Ayer, general air-brake inspector, Southern Pacific, San Francisco, Cal.; J. P. Stewart, general supervisor air brakes, Missouri Pacific, St. Louis, Mo.; R. E. Baker, general air-brake inspector, Boston & Maine, Boston, Mass.

(The report was approved and recommendations ordered submitted to letter ballot.)

Prices for Labor and Materials

In order that the rules may currently provide an equitable basis for inter-road billing, the committee has continued the work of analyzing material, labor and new equipment costs in A. A. R. Interchange Rules 101, 107, 111 and 112 of the Freight Car Code, and Rules 21 and 22 of the Passenger Car Code, with a view of determining and recommending necessary changes to be made in the next supplement to the current Code.

Rule 101

All miscellaneous material prices in Rule 101 were rechecked as of March 1, 1938, quotations from purchasing agents of the 10 selected railroads, representing 39 per cent of total freight-car ownership in the United States and Canada, indicating no changes were necessary in new or scrap prices except in the case of pipe fittings.

Due to changes in combination labor and material items in Rule 111 effective January 1, 1938, Items 38, 40, 42, 45, 46, 47, 48 and 49 of Rule 101 covering retaining valves and release valves, are modified to harmonize.

Item 49-A is relocated as new Item 82-A under list of AB type brake material and modified to cover material only, the labor charge being provided for in Item 27 of Rule 111. Former Items 58 to 76, inclusive, have been relocated as new Items 98 to 99-G, inclusive. Note following Item 57-U is relocated to follow new Item 85.

New Items 58 to 85, inclusive, have been added, covering AB type brake material.

Allowances opposite Items 116, 118 and 120 have been reduced to basis of 60 per cent instead of 75 per cent of value new for type-D coupler bodies, and those opposite Items 124 and 125 to basis of 30 per cent instead of 50 per cent of value new for former and temporary standard couplers, to agree with adjusted allowances for older types of couplers in Rule 104, as suggested by the Committee on Couplers and Draft Gears and recommended in the 1938 report of the Arbitration Committee.

The table of weights of truck spring coils is modified to include weight of the 5½-in. by 8¼-in. spring. Reference to truck-spring capacity is eliminated from this table since it is unnecessary for billing purposes.

Rule 107

Notes are added to Items 128 and 158, and the last note under Item 270 is modified, to clarify the intent.

Allowances opposite Items 260 and 261 are modified in accordance with detail time studies of these operations.

Former Items 301 to 316, inclusive, covering specified allowances for dismantling various types of cars, are eliminated; and a new Item 301, with notes, added, to establish price for dismantling all types and classes of cars on authority of owners, on a per pound price for metal contained in car. It is felt this method of charging will simplify the rule. The allowance is equitable, being based on actual time studies of the operation made by a special subcommittee on five railroads and including 29 cars of various classes and types.

Rule 111

Revision of Item 15, to provide an average charge (including both labor and material) for C. O. T. & S. of AB freight brake equipment, based on time studies conducted on six railroads in various sections of the country, is recommended. This is similar to the allowance now in the rule for C. O. T. & S. of K. type brakes; it greatly simplifies the billing and eliminates the necessity for following individual valves through the air-brake room or manufacturer's plant and holding billing until a list of the material renewed in each case is available. It will also eliminate numerous controversies arising in connection with such charges.

New Items 16 to 27, inclusive, are added to this rule, to establish definite allowances for a number of operations in connection with AB brake equipment parts, now charged on the basis of actual time. These allowances are also based on time studies of the various operations.

Interpretation No. 1 is modified to harmonize with the change in allowance in Item 3 of this rule.

Rule 112

Recommendations are made in this rule respecting reproduction pound prices of new freight-train cars of all classes, in order that Supplement of August 1, 1938, may reflect 1937 costs in lieu of figures shown in the present Code. New prices recommended are based on costs of 47,270 freight cars constructed during 1937.

As Class F cars (all-wood) were prohibited in interchange effective April 1, 1937, and the Arbitration Committee eliminated this class of car from the depreciation rate and depreciation limit tables in Rule 112 effective January 1, 1938, it is recommended that the Class F car also be eliminated from the per-pound reproduction-cost table.

Passenger Car Rules 21 and 22

Item 25-B of passenger-car Rule 21 is modified to clarify the intent with respect to prices for two-wear wrought-steel wheels. No modifications are recommended in passenger-car rule 22.

It is the intent of the Committee to investigate labor and material costs again in October and if sufficient change develops, necessary revision will be made and inserted in the Rules effective January 1, 1939.

[The changes recommended in the existing rules are shown in detail in the report.—Editor.]

The report was signed by A. E. Calkins (chairman), superintendent equipment, New York Central; H. H. Harvey (vice-chairman), general car foreman, Chicago, Burlington & Quincy; T. J. Boring, general foreman, M. C. B. Clearing House, Pennsylvania; H. H. Boyd, assistant chief motive power and rolling stock, Canadian Pacific; A. E. Smith, vice-president, Union Tank Car Company; A. H. Gaebler, superintendent car department, General American Transportation System, Inc.; P. Kass, superintendent car department, Chicago, Rock Island & Pacific; F. J. Dodds, general car inspector, Atchison, Topeka & Santa Fe; O. A. Wallace, supervisor car repairs, Atlantic Coast Line; and D. F. Nourse, A. A. R. inspector, New York, New Haven & Hartford.

The report was accepted.

Report on Tank Cars

During the year the committee considered a total of 346 dockets and applications for approval of designs of which 221 covered shipping containers of twenty classes, for application to new cars or for replacement on existing cars. Four applications covered 27 multi-unit cars to be used for the transportation of 15 Class ICC-106-A-500 one-ton containers each. Sixteen applications covered 187 new underframes and trucks for use in mounting existing tank-car tanks.

Eighty-three applications covered alterations in existing equipment consisting of application of exterior heater pipes, interior heater pipes, insulation, lining, reinforcing bands, tank stabilizers, tank shell reinforcement at dome flange and reinforcement at center sills of multi-unit tank cars, also conversion from single to two compartments, from single to three compartments, from ARA-III to ARA-III insulated, from ARA-IV to ARA-III insulated, from A.R.A.-IV to A.R.A.-III, from ICC-103 to ICC-103 insulated, from ICC-103 to ICC-103-A, from ICC-103 to ICC-103-B, from ICC-103 to ARA-203, from ICC-104 to ICC-103 insulated, and conversions for Fullers Earth service and for phosphorus service.

Classes of Shipping Containers Approved for Application to New Cars or for Replacement on Existing Cars

Class	No. of tanks
ICC-103	1,168
ICC-103-A	471
ICC-103-AL (Aluminum)	45
ICC-103-B	65
ICC-103-B-W (Fusion welded seams)	2
ICC-103-C-W (Fusion welded seams)	12
ICC-103-W (Fusion welded seams)	10
ICC-104	3
ICC-104-A	23
ICC-105-A-300	67
ICC-105-A-300-W (Fusion welded seams)	64
ICC-105-A-400-W (Fusion welded seams)	125
ICC-105-A-500	70
ICC-106-A-500	1,115
ICC-106-A-800	1
ICC-107-A****	2
AAR-201-A-35	2
AAR-201-A-35-W	17

Eighteen applications requested approval of tank-car appurtenances as follows: One anchorage for Class ICC-105-A series tank cars in chlorine service; one angle valve for propane and anhydrous ammonia service; two bottom-outlet nozzle, steam-jacketed; one bottom-outlet valve for tanks in asphalt service; one dome cover, bolted type, modified design; two dome safety platform; one dome-cover safety device; one dome cover, quick opening; one insulation; one protective housing for top unloading connections; one removable eduction tubes for Class ICC-106-A-500 containers; one sampling device; one safety valve, tanks in chlorine service; one safety valve, tanks in propane and anhydrous ammonia service; one safety vents, Class ICC-103-B tank-car tanks; one valve for Class ICC-106-A-500 containers, design modified.

Tank Cars for Dual Lading Service

The Interstate Commerce Commission, by modification, effective April 15, 1938, of second subparagraph, Par. 431(a) of their regulations for the transportation by rail of explosives and other dangerous articles in freight service permitted the use of tank cars "equipped and authorized as indicated by the name of the commodity stenciled on the tank" for additional use in transporting other commodities under requirements prescribed therein.

A total of four applications has been considered by your committee under this requirement, one covering cars for transporting propane or anhydrous ammonia and three for cars to transport anhydrous ammonia or nitrogen fertilizer solution.

Fusion-Welded Tank-Car Tanks

Since the public hearings before the Interstate Commerce Commission, at Washington, D. C., on September 5, 6 and 7, 1934, on the matter of fusion-welded tank-car tanks for the transportation of dangerous commodities the commission have authorized, by order, a total of 523 fusion-welded tanks for experimental service trials.

No general revision of the Interstate Commerce Commission specifications for tanks to be mounted on or to form part of a car has been made since 1930. Your committee is now actively engaged in revising the specifications, effective in 1931, bringing them into conformity with current demands of owners, shippers and other interested parties.

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Aluminum Tanks for Transporting Dangerous Commodities

By order, the Interstate Commerce Commission has authorized the construction of 30 tank cars equipped with riveted aluminum tanks (Class ICC-103-AL) and their use in experimental trials in transporting commodities classed as dangerous by the commission's regulations.

The report was presented by Chairman G. S. Goodwin, assistant to general superintendent motive power, Chicago, Rock Island & Pacific, Chicago; Vice-chairman F. A. Isaacson, engineer car construction, Atchison, Topeka & Santa Fe, Topeka, Kan.; A. G. Trumbull, chief mechanical engineer, Chesapeake & Ohio, Cleveland, Ohio; G. McCormick, general superintendent motive power, Southern Pacific, San Francisco, Cal.; W. C. Lindner, chief car inspector, Pennsylvania, Philadelphia, Pa.; A. E. Smith, vice-president, Union Tank Car Company, Chicago; G. A. Young, head, school of mechanical engineering, Purdue University, La-Fayette, Ind.; F. Zeleny, engineer of tests, Chicago, Burlington & Quincy, Aurora, Ill.; W. C. Steffa, transportation manager, Sinclair Refining Company, New York; R. T. Baldwin, secretary, Chlorine Institute, Inc., New York; H. J. Gronemeyer, supervisor car equipment, E. I. duPont de Nemours & Company, Inc., Wilmington, Del.; R. W. Thomas, manager Philgas department, Phillips Petroleum Company, Detroit, Mich.

(*The report was approved.*)

Loading Rules

General Rules

Rule 4

Change wording of Section (c) to read:

To obtain full capacity or load weight the load should be placed in two piles over bolsters or uniformly distributed over car floor. Short material loaded between body bolster and end of car must not exceed twenty per cent of stenciled load limit. Concentrated loads 18 ft. long or less must not exceed seventy-five per cent of stenciled load limit.

Eliminate the note following Section C.

Reason—Reference to wooden cars now unnecessary.

Rule 8

Eliminate and substitute the word "Vacant" in Section (c).

Reason—Not required because wooden underframe cars are not interchangeable.

Rule 16

Add to first sentence of Section (a) "except as provided for in paragraph (f)".

Change Section G to read:

When material is of unequal lengths and overhanging one or both ends, the weight of load shall be based on the average lengths of pieces in the overhang, measured from center of truck to ends of load. When the material in the overhang is of various lengths, the allowable width shall be based on the total width of the overhang at the extreme ends. Table I is based on the end of load opposite the overhanging and being located 18 in. from the face of end sill of car. In cases where the type of brake and load permits utilizing part or all of this space, thereby, making the overhang less than specified in the tables, the width of load and the percentage of load weight may be increased in accordance with the shorter overhang.

Reason—To clarify the intent of the rule.

New Figures Proposed

New figures have been proposed, for addition to the rules, as follows:

Fig. 5—To show the length of slotted hole for center pin in center-plate backing.

Fig. 46-A—Revised method for loading light roof trusses.

Fig. 56-A—Alternate method for securing structural steel, shapes and rods with high-tension bands.

Fig. 75-A—Method of loading wire coils.

Fig. 83-A—Alternate method of using 1¼-in. instead of 2-in. high-tension bands for securing wrought-iron pipe.

Fig. 146-A—Alternate method for securing locomotive type boilers with high-tension bands.

Fig. 146-B—Alternate for securing small boilers with high-tension bands.

Revisions to Existing Figures

Fig. 6

Add note following item F to read: *For loads per sketch 2, use not less than 8 pr. of stakes, items B, and eliminate items D and F.*

Reason—By request of shippers.

Fig. 27

Sketch and specifications revised to include binder added at center to provide greater safety.

Fig. 28

Change heading to read:

Minimum requirements for securing entirely creosoted and other poles, etc.—*gondola cars.*

Change item C to read:

Number of Pieces	Description
For loads 3 ft. or less above top of car sides, 1 ea. pr. stakes.	4 strands, 2 wrappings, ⅛ in. dia. wire across top of load, twisted taut.
For loads over 3 ft. above top of car sides, 2 ea. pr. stakes.	6 strands, 3 wrappings, ⅛ in. dia. wire, halfway between top of car sides and top of load and over top load. For entirely creosoted poles use 3 items C, equally spaced. Twist taut.

Change last paragraph to read:

When ends of 2 piles are interlaced, use 6 pair of stakes for total length of load, unless interlace exceeds 36 in., when 5 pair of stakes for total length of load may be used with 1 pair at center of interlaced ends.

Reason—To provide greater safety.

Fig. 29

Sketch and specifications revised to include binder, added to provide greater safety.

Fig. 30

Sketch and specifications revised to provide greater safety.

Fig. 31

Change heading to read:

Minimum requirements for securing long poles, piling, telegraph poles, etc., excluding entirely creosoted poles, loaded on top of single loads—*flat or gondola cars.*

Reason—To indicate that this figure does not cover entirely creosoted poles.

Fig. 32

Sketch and specifications revised to cover loads overhanging at one or both ends of car, or loads on two or three cars.

Fig. 35

Change item E to read:

Number of Pieces	Description
3 per pile.	6 in. by 8 in., hardwood, length to suit. For piles 20 ft. to 30 ft. long, inclusive, the center clamps may be substituted with 2 pr. items B.

Change item G to read:

2 ea. item E. 1 in. dia. *with washers.*

Change second paragraph to read:

Items E, F, G and H are not required when *more than 3 pr. items B, C and D* are used or vice versa.

Reason—To strengthen load as per request of shippers.

Fig. 37

Sketch and specifications revised.

Reason—Item E, eliminated—not required.

Fig. 38

Sketch and specifications revised.
Reason—Item F, eliminated—not required.

Fig. 41

Change heading to read:
Minimum requirements for securing flat plates, on top of car with sides not over *48* in. high.
Reason—To make applicable to modern equipment with car sides 48 in. high.

Fig. 42

Change heading to read:
Minimum requirements for securing flat plates, on top of car with sides not over *48 in.* high.
Reason—To make applicable to modern equipment with car sides 48 in. high.

Fig. 43

Change the second note following item E to read:
Plates 24 in. wide or less, and not more than 18 in. less than inside width of car, loaded crosswise as per sketch 3, do not require bracing to prevent side shifting when the ends of alternate piles are placed against car sides.
Reason—To indicate when bracing is required to prevent side shifting.

Fig. 46

Eliminated.
Reason—Being consolidated with Fig. 47.

Fig. 47

Sketch and specifications revised.
Reason—Diameter of rods for loads weighing 30,000 lb. or less increased from ¾ in. to ⅞ in., and from ⅞ in. to 1 in. for loads weighing over 300,000 lb., and rods of 1¼ in. dia. eliminated, by request of shippers.

Fig. 48

Change item C to read:
6-in. by 8-in., hardwood. Place one bolt, ½ in. dia., crosswise, with washers, at each end to prevent splitting.
Reason—By request of shippers.
Change second sentence of item G to read:
When sliding-piece is located between end of car and body bolster, the weight on same must not exceed 20 per cent.
Reason—To eliminate reference to wooden and steel underframe cars.
Add new paragraph to read:
For flat cars add one binder to overhang, above couplers, in which case dimensions of binders may be 4 in. by 6 in., with split bolts.
Reason—To strengthen load on flat cars.

Fig. 49

Change item C to read:
6 in. by 8 in., hardwood. ½ in. dia. bolt with washers at each end to prevent splitting.
Reason—By request of shippers.
Eliminate second sentence in last paragraph reading: Load carried between bolster and end of adjacent car must not exceed 15 per cent of load weight limit, wooden underframe cars, and 20 per cent of load weight limit, steel underframe cars.
Reason—Covered in General Rule 4.

Fig. 50

Change item C to read:
6-in. by 8-in., hardwood. ½ in. dia. bolt with washers at each end to prevent splitting.
Reason—By request of shippers.
Eliminate second sentence in last paragraph reading: Load carried between bolster and end of adjacent car must not exceed 15 per cent of load weight limit, wooden underframe cars, and 20 per cent of load weight limit, steel underframe cars.
Reason—Covered in General Rule 4.

Figs. 51 and 51-A

Eliminate the words "and 17", from next to last paragraph.
Reason—Rule 17 has been eliminated.

Fig. 52

Change item C to read:
6-in. by 8-in., hardwood. ½ in. dia. bolt with washers at each end to prevent splitting.
Reason—By request of shippers.
Eliminate the words "and 17" from last paragraph.
Reason—Rule 17 has been eliminated.

Fig. 53

Sketch and specifications revised.
Reason—Reference to girder loading eliminated.

Fig. 54

Sketch and specifications revised.
Reason—Reference to girder loading eliminated.

Fig. 55

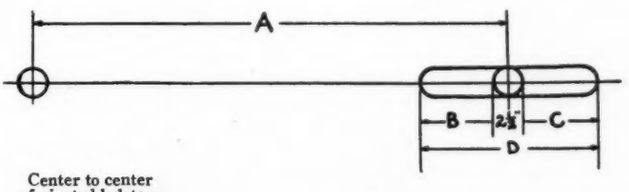
Eliminated.
Reason—Consolidated with Figs. 53 and 54.

Fig. 57

Sketch and specifications revised.
Reason—Reference to girder loading eliminated.

Fig. 62, 63, 63-A, 64, 66 and 135

Reference to New Fig. 5 included for length of slotted center pin hole.
Reason—Fig. 5 has been provided to show length of slot in center-plate backing, as it has been found that present length of slot is not adequate for safe transportation of long girders, etc.



Center to center of pivoted bolsters A	B	C	D
49 ft. to 70 ft. inc.	2 in.	1¼ in.	5¾ in.
71 ft. to 80 ft. inc.	2¼ in.	1¾ in.	7 in.
81 ft. to 90 ft. inc.	2¼ in.	2½ in.	7¾ in.
91 ft. to 100 ft. inc.	2¾ in.	3½ in.	8¾ in.
101 ft. to 110 ft. inc.	4⅛ in.	4¾ in.	11⅜ in.
111 ft. to 120 ft. inc.	4⅛ in.	6 in.	12⅜ in.

Prepare cars as per Fig. 3. Before locating center plate backing on carrying cars, push cars together to eliminate all coupler slack between cars. Center pins to be located in hole as shown in the above figure.
Dimensions of center plate backing must be not less than 3 in. × 12 in. × 5 ft. and wide enough to provide 2 in. of material beyond each end of slotted hole.

New Fig. 5—Minimum dimensions of slot in center plate backing for center pin used in connection with pivoted bolster

Fig. 77

Change heading to read:
Minimum requirements for securing sheet steel one-eighth inch thick or less in single-tiered piles, 20 in. high or less above car floor, with No. 8 gage high-tension wire, strength 2,000 lb. per strand, and with ends of load not less than 6 ft. from ends of car—flat cars.
Reason—To indicate the maximum thickness of sheets covered by this method of loading.

Fig. 78

Change heading to read:
Minimum requirements for securing sheet steel one-eighth inch thick or less, in single-tiered piles, 20 in. high or less, above car floor, with high-tension bands, and with ends of load not less than 6 ft. from ends of car—flat cars.

Reason—To indicate the maximum thickness of sheets covered by this method of loading.

New Fig. 83-A

Sketch and specifications revised.

Reason—Shippers requested alternate method of using 1¼-in. instead of 2-in. high tension bands.

Fig. 115

Change note to read:

Note: Items B to G, inclusive, may be substituted with two strands, one wrapping, ⅛ in. dia. wire in cases where load extends six inches or less above top of car sides, or ends, or when pyramided from top of car sides to not more than 18 in. at center of car and wired down so as to prevent scrap from projecting beyond car sides or ends. Wire must be spaced not more than 3 ft. apart and secured to stake pockets or car sides.

Reason—To improve the method of loading.

Alternate to Present Fig. 127

The committee has been working on a method for securing transformers on flat cars, alternate to present Fig. 127, but was unable to complete it in time for this report. Efforts, however, are being made to have it completed in time for letter ballot, a large shipper having requested that it be included in the next issue of the loading rules.

Fig. 153

Change first paragraph to read:

Anchoring the rotating portion to crawler structure with items Q, 2 at rear and 2 at front, is permissible, provided the machine is tied to car, at front and rear, with suitable rods or cables to prevent teetering. When boom is detached, items Q must be applied at rear to car body and at front to the crawler structure.

Reason—To clarify the intent of the rule.

Fig. 168-B

Eliminated.

Reason—Shippers decline to use it because it is too expensive.

Fig. 176

Change item G under "No. of Pcs." to read: 4 ea. axle.

Reason—To clarify the intent.

The report was signed by W. B. Moir (chairman), chief car inspector, Pennsylvania; E. J. Robertson (vice-chairman), superintendent car department, Minneapolis, St. Paul & Sault Ste. Marie; R. H. Dyer, general car inspector, Norfolk & Western; G. R. Lovejoy, master mechanic, Detroit Terminal; T. O. Sechrist, assistant superintendent machinery, Louisville & Nashville; C. J. Nelson, superintendent of interchange, Chicago Car Interchange Bureau; H. S. Keppelman, superintendent car department, Reading; T. W. Carr, superintendent rolling stock, Pittsburgh & Lake Erie, and A. H. Keys, district master car builder, Baltimore & Ohio.

The report was approved and recommendations ordered submitted to letter ballot.

Rules for Using Liquid Petroleum Gases

The attention of your Subcommittee on Underwriters' Laboratories Tentative Outline for Inspection and Labeling of Self-Propelled Railroad Equipment Utilizing Internal Combustion Engines was brought by the Railroad Insurance Association to the necessity for specifications for the installation of containers for liquefied-petroleum-gas systems and piping or other facilities to the gas-consuming unit, including internal-combustion engines for self-propelled cars or auxiliary units, and heating for various purposes, as well as lighting.

In view of the varied interests involved a conference was held by your committee on October 26, 1937, with representatives of the following associations and companies: Underwriters' Laboratories, Inc., Railroad Insurance Association, Compressed Gas Manufacturers Association, National Bottled Gas Association, Shell Petroleum Corporation, and Phillips Petroleum Company.

During the years 1935, 1936 and 1937, the use of liquefied petroleum gases by the railroads has increased materially. Some of the typical uses of these gases on equipment are: (1) Internal-combustion-engine operation of air-conditioning equipment and electric generators; (2) switching locomotives with electric or geared drive powered by internal-combustion engines; (3) cooking in diners, cafe cars, business cars and freight cabooses; (4) gas lighting of coaches; (5) switch heating to prevent accumulation of snow and ice; (6) metal cutting and miscellaneous shop use, and (7) heating of refrigerator cars in cold weather.

Because of this widespread development it has been necessary to prepare regulations for the guidance of the railroads. These regulations are intended to govern the location, design and construction of fuel containers and other equipment necessary for the safe and efficient use of liquefied petroleum gases on railway coaches, motor cars, locomotives and other mobile equipment, and the storage and handling of these gases in cylinder quantities in railroad yards and terminals.

In the further interests of safety it is equally important that employees understand the inherent hazard of these gases, that they may be thoroughly trained in safe practice for the storage, handling and distribution of fuel containers and in the operation of liquefied petroleum gas utilization equipment.

The Interstate Commerce Commission defines a compressed gas as any material with a gage pressure exceeding 25 lb. per sq. in. at 70 deg. F., or any liquid flammable material having a vapor pressure (determined by the Reid Method) exceeding 40 lb. per sq. in., absolute, at 100 deg. F., March to October, inclusive, or exceeding 45 lb. per sq. in., absolute, at 100 deg. F., November to February, inclusive.

The composition of liquefied petroleum gases varies, but in all of the established grades the predominant compounds are propane and butane (isobutane and normal butane). Under moderate pressure these gases liquefy, but upon release of the pressure are readily converted into the gaseous phase. Advantage of this characteristic is taken by the industry, and for convenience and economy the gases are shipped and stored under pressure as liquids. When in the gaseous state these gases present a hazard comparable to any flammable natural or manufactured gas, except that being heavier than air, ventilation requires added attention.

In the customary method of utilization of liquefied petroleum gases as motor fuel, the liquid is forced by its own vapor pressure out of the fuel tank, through a liquid pressure-reducing regulator to a vaporizer or heat exchanger where it is completely vaporized. The gas then passes through either one or two stages of pressure reduction in approved regulators to reduce it to substantially atmospheric pressure, thence to the gas-air mixer or carburetor where it is mixed with the required volume of air and delivered to the intake system of the engine. Propane can be vaporized directly from the fuel tank without the use of a vaporizer except when the volume used is so great that the refrigeration caused by vaporization reduces the vapor pressure in the tank too greatly. In the latter case and with other liquefied petroleum gas products vaporization is accomplished in a vaporizer or heat exchanger usually heated by water from the engine cooling system or by hot gases from the engine exhaust. When a water-heated exchanger is used in connection with propane it is necessary to provide sufficient exchange surface to prevent freezing of water when self-vaporization of fuel occurs before circulation of water begins.

Generally no vaporizer is needed when propane in cylinders is used for small internal-combustion engines operating car air-conditioning or car electric-generating equipment nor are they needed for gas-cooking or gas-lighting installations, provided a sufficient number of containers are installed to meet the demand of the connected load.

[At this point in the report the committee submitted in detail tentative regulations for the design, construction, installation and operation of liquefied petroleum gas installations on mobile railway equipment. These regulations will be the subject of an article in a later issue.—Editor.]

The report was signed by Chairman W. E. Dunham, superintendent car department, Chicago & North Western; E. Wanamaker, electrical engineer, Chicago, Rock Island & Pacific, and W. J. Madden, assistant foreman, Pennsylvania.

(***The report was approved and ordered submitted to letter ballot for adoption as recommended practice.***)

Specifications for Materials

The committee, during the past year, reviewed all of the specifications and submitted the following revisions for consideration.

Specifications M-115-37, Boiler and Firebox Steel for Locomotives

Under Subdivision I, Manufacture, Section 2, add paragraph identified as (c), to read as follows:

(c) All plates shall be cut so that length shall extend in direction of rolling, unless otherwise agreed upon.

Specifications M-202-37, Design Test Requirements for Truck Bolsters

Revision consisting of adding specification numeral identification in Section 2. Paragraph to read:

2. Material.—Shall be one of the following, as designated, and shall conform to the latest revision of the appropriate specifications:

Cast steel .....(Spec. M-201)
Structural steel .....(Spec. M-116)
Forged iron .....(Spec. M-307) *or*
Forged steel .....(Spec. M-102 and M-104)

Specifications M-203-37, Design Test Requirements for Truck Side Frames, Cast Steel

Revision consists of adding specification numeral identification in Section 2, the section to read:

2. Material.—Shall be of cast steel in accordance with latest revision of A. A. R. Specifications M-201, Grade B.

Specifications M-205-32, Design Test Requirements for Coupler Yokes

Revision consists of adding specification numeral identification in Section 2, the section to read:

2. Material.—Shall be one of the following, as designated, and shall conform to the latest revision of the appropriate specifications:

Cast steel .....(Spec. M-201)
Structural steel .....(Spec. M-116)
Forged iron .....(Spec. M-307) *or*
Forged steel .....(Spec. M-102 and M-104)

Specifications M-306-37, Welded Wrought Iron Pipe

Corrections and additions have been made in Sections 1, 2, 3, 5, 6, 12 and 17, and in Table I.

Specifications M-501-34, Lined Journal Bearings

Section 8. Gaging, to be changed to read as follows:

8. Gaging.—All bearings shall conform to the latest standards of the Mechanical Division of the Association of American Railroads, with respect to form, dimensions and variations therefrom, *as shown on sheets B-21 and D-23 of the Manual of Standards and Recommended Practice.*

Changes in Specifications for Rubber Products

Each of the specifications pertaining to rubber has been revised extensively as to form and substance, and recommended specifications were included as part of the report. Those specifications are:

Specification No.	Title
M-601-38	Hose, air brake and train air signal
M-602-38	Gaskets, air brake hose
M-603-38	Hose, air, gas and oxygen, wrapped and braided
M-604-38	Hose, cold water, wrapped and braided
M-605-38	Hose, steam and hot water
M-606-38	Hose, tender tank
M-607-38	Rubber goods, general instructions on standard methods of test for

Specifications M-904-36, Reclaimed Car Oil

This specification has been reviewed by a joint sub-committee representing the Specifications and Lubrication Committees.

The joint sub-committee's report and recommendations applying to specification M-904-36 were covered in their report of May 12, 1938, addressed jointly to the chairmen of the Specifications and Lubrications Committees. An excerpt from this report follows:

"The Joint Sub-Committee recognized the fact that the information made available through the 1936-38 survey divides the car oils now reclaimed by the railroads in the country into four general classes:

"(1)—Those employing a washing process and treatment with caustic and separation of the dirt and impurities by settling.

"(2)—Those employing a process of distillation.

"(3)—Those employing a centrifuge or mechanical means for the removal of the dirt, followed by filtration and settling.

"(4)—Those employing filtration and settling without special chemical treatment or mechanical apparatus.

"In redrafting revised Specification M-904-38 and new Specification M-910-38 at this meeting, the joint sub-committee took cognizance of the fact that there is a clear differentiation between the degree of cleanliness of the renovated materials by the processes now in general use as indicated by the values of 'tarry matter' and 'insoluble impurities' in the case of the oils, and of the 'total impurities (incl. tarry matter),' in the case of the wastes and packings. It is apparent that it would be possible to set lower limits on the permissible impurities in car oils renovated by either the chemically treated or the distillation processes than with the centrifuged oils, and that a specification to include the oils in the fourth class (filtered and settled) would be of little or no value.

"It is further apparent that the reason for the relatively higher impurities in the oils renovated by centrifuging is due to the higher fine dirt content in this class of renovated oil. After full discussion, the joint sub-committee was of the opinion that the presence of fine dirt in the oil is detrimental and that its permissible quantity, therefore, should be limited. It was the consensus of opinion at the meeting that the presence of colloidal material in an oil *used with waste* for journal lubrication is objectionable for the reason that the finely divided material gets into the fibres of the waste and retards capillary feeding of the oil to the journal.

"It is not the desire or the intent of the joint sub-committee, however, to set the limits for the allowable impurities in acceptable renovated oil so low that they may not be realized with present mechanical equipment (centrifugal separators, etc.) now available and owned by a number of railroads. It is felt that the limits set can be met with mechanical equipment available when properly operated and controlled."

The recommendations of the joint sub-committee and the proposed specification M-904-36 were reviewed by the Committee on Specifications for Materials at a meeting held May 24 and 25, 1938. Certain changes in wording were approved by the committee as a whole, and the proposed specifications were changed accordingly by the joint sub-committee chairman. The proposed specification, M-904-38, was submitted with the report.

The discussion in the meeting of the Specifications Committee developed a minority opposition to full approval of the proposed specifications. This minority, representing railroads using mechanical process of renovating, were not agreeable to acceptance of limits set up for items (4) tarry matter, and (5) insoluble impurities (dirt), shown in Section 5 of the specifications.

A discussion of the points in question in this specification, is given in the following excerpt from the minutes of the Specification Committee:

"Discussion developed that all were in agreement with the specification, except in respect to limits shown for items (3) water; (4) tarry matter; (5) insoluble impurities (dirt), as set up in Paragraph 5, Section II—Properties and Tests. Mr. Jackson explained to the committee that the limits as set up in this specification were based on results of tests on samples of reclaimed packing and oil submitted by various members and, while it was true the results of certain samples from certain roads did not comply with the limits set up, his sub-committee felt that oil conforming to the proposed specification requirements represented an oil of desirable properties. The discussion brought out further that, apparently to meet these requirements in renovating the oil, chemical treatment would be involved. Messrs. Zeleny and Staib cited the results of centrifuging, which would not conform to the proposed limits for tarry matter and insoluble impurities, and they were in doubt as to the necessity for such low limits for these two items. Mr. Chapman advised

that the Santa Fe's experience in mechanically renovating the oil was in accordance with that reported by Mr. Zeleny.

"The discussion ensuing brought out there was general agreement that fewer hot boxes apparently occurred in connection with the use of renovated oil and packing than in the use of new oil and packing—this, in particular, in cases of new brass and journal; one explanation being that the insoluble impurities acted as a polishing and burnishing agent, bringing about satisfactory conditions in respect to avoiding hot boxes. However, there was not unanimous agreement, assuming the above took place, that undue wear would not occur with continued use of the same renovated waste and oil. Messrs. Staib and Zeleny stated it was their opinion the chief benefit from renovated waste and oil was largely due to freeing and fluffing up the waste proper and removing the coarser particles from the oil.

"Another point emphasized on the part of Mr. Zeleny was the fact there is more oil lost due to using chemical means of renovating than in renovation involving mechanical methods, it being reported that, in using chemical methods, the loss was over 15 per cent more than when renovated by mechanical means, namely, centrifuging. It was also brought forth that there was a higher cost per gallon in case of renovation involving chemical treatment as compared with mechanical, but no one present had actual figures available.

"Mr. Bryant brought up the question as to the propriety of requiring such a low content for tarry matter and insoluble impurities in the new car oil specification, namely, maximum 0.10 per cent for each item, if a higher content of these two items was to be permitted in reclaimed oil, and that, if these limits were broadened in case of the new oil, undoubtedly it could be purchased at a cheaper price. To this, Mr. Zeleny replied that it costs very little more for the oil refiner working with crude oil to keep the tarry matter and insoluble impurities to the low figure, whereas it is rather expensive to do the same with used oil, and such expense is not warranted.

"Mr. Jones suggested that valuable information could possibly be obtained by a study of results of tests on reclaimed and new oil under the same conditions at the Indianapolis testing plant. it being his understanding that some tests of this character had already been carried out."

Final recommendations of the Specification Committee are that the present specification be continued in effect, and that the proposed specification M-904 be circularized among the members of the Association as information, with the request that study be given the application of the proposed requirements during the coming year; also that the Lubrication Committee be notified of this proposal, and later arrangements be made for a joint meeting to discuss the matter as a whole and attempt to reconcile the differences involved.

Proposed Specifications M-910-38. Renovated Journal-Box Waste and Packing

This specification was covered in the report of May 12, 1938, of the joint sub-committee on Specifications for Lubrication Materials, and an excerpt from this report is given above.

The proposed specification is intended to replace requirements for renovated packing, included as part of Rule 66, in the Code of Rules Governing the Condition of, and Repairs to Freight and Passenger Cars for Interchange of Traffic, the requirements in Rule 66 having been drafted in the Association standard specification form. The proposed specification M-910-38 was included as part of this report.

In case of adoption of Specification M-910-38, revision should be made in Sections 4 to 8, inclusive, of Rule 66, page 127, 1937 Revised Code of Rules. A proposed draft of such changes was included in the report. Since methods of analysis are made part of the new Specification M-910-38, Methods for Analysis of Reclaimed Waste, Section L of the Manual, page L 35-B, 1937, should be withdrawn, if and when Specification M-910-38 is adopted.

The Committee on Specifications for Materials has considered this new specification, M-910-38, and other recommendations pertaining thereto, and this Committee's recommendation is that the present requirements be maintained and that this proposed specification also be circularized among the members of the Association as information, with request that study be given the application of the proposed specification requirements during the coming year; also the Lubrication Committee to be notified of this proposal, and later arrangements be made for a joint meeting to discuss the matter as a whole, and attempt to reconcile any differences involved.

Specification for Brushes

The Purchases and Stores Division has suggested the desirability of developing uniform specifications for brushes. A subcommittee is now working on this matter.

Recommendations

The committee recommended that the above revisions in specifications, with the exception of those outlined in the case of specifications for lubrication materials, be approved for submission to letter ballot.

The report was signed by T. D. Sedwick (chairman), engineer of tests, Chicago, Rock Island & Pacific; E. E. Chapman (vice-chairman), mechanical assistant, Atchison, Topeka & Santa Fe; F. Zeleny, engineer of tests, Chicago, Burlington & Quincy; H. G. Burnham, engineer of tests, Northern Pacific; C. B. Bryant, engineer of tests, Southern; H. G. Miller, engineer of tests, Chicago, Milwaukee, St. Paul & Pacific; H. P. Hass, engineer of tests, New York, New Haven & Hartford; J. R. Jackson, engineer of tests, Missouri Pacific; J. W. Hergenhan, assistant engineer, test department, New York Central, and L. B. Jones, engineer of tests, Pennsylvania.

The report was approved and recommendations of the committee ordered submitted to letter ballot.

Report of Arbitration Committee

With the approval of the Operating-Transportation Division, no extension in effective date beyond January 1, 1939, is recommended for requirement in Paragraph (a-8) of Rule 3, prohibiting acceptance of cars in interchange bearing advertisements of any shipper, consignee or product.

With the approval of the General Committee and the Committee on Tank Cars, the members and all tank-car owners were notified on November 22, 1937, that effective date of Paragraph (t-8) of Rule 3, prohibiting the acceptance in interchange of tank cars having head block-anchorage on and after January 1, 1939, would not be further extended. Your committee so recommends.

The Committee on Couplers and Draft Gears, in its report last year, recommended that requirement be included in Rule 3 to prohibit the use of all 5-in. by 5-in. and all former standard 5-in. by 7-in. shank couplers (except type D), effective January 1, 1942, in order to reduce the number of pull-outs and to gain the advantage of the increased strength of the standard coupler. Your committee concurs and recommends such requirements to be incorporated in Section (c) of the rule.

A time limit (January 1, 1943) is recommended for inclusion in Paragraph (t-10) of Rule 3, within which all tank cars requiring metal placard holders must be so equipped.

Modification of Rules 3, 18 and 104 is recommended in connection with adoption of specification for secondhand couplers by letter ballot last year, which are in accord with suggestions contained in the 1937 report of the Committee on Couplers and Draft Gears. Upon recommendation by the same committee, a further revision of Rule 18 is proposed, extending the present 6½-in. condemning limit for horizontally inclined cracks in knuckle wall back of knuckle tail, to 7½ in., with prohibition that coupler bodies so condemned must not be reclaimed by welding.

A car owner desiring to effect betterments or change the standard of individual parts of his cars, such as wheels, brake beams, etc., is confronted with the problem of removing serviceable parts for the purpose of making the new application. A new paragraph is recommended under Rule 16, to permit stenciling of cars for the new standard prior to application, so that during the transition period foreign lines may renew in kind or substitute the new standard as the individual parts become defective.

Another economy measure is recommended in Rule 17, to permit the substitution of one type of non-approved draft gear

for another type of non-approved gear, as correct repairs, providing the gear applied conforms with the one removed as to sill spacing and coupler pocket limits.

Due to a number of accidents caused by failure of old L- and T-section cast-steel side frames, with the concurrence of the General Committee and Committee on Car Construction, revision of Rules 3, 19 and 23 have been recommended for submission to letter ballot, to prohibit welding of any description on such side frames or the application of such welded side frames to foreign cars.

All recommendations for changes in the Rules of Interchange submitted by members, railroad clubs, private car owners, etc., have been carefully considered by the committee and, where approved, changes have been recommended. The detail recommendations are as follows:

Freight-Car Rules

Rule 2

The committee recommends that third paragraph of Section (b) of this rule be modified as follows:

Proposed form—*Any* leaky tank car, *regardless of commodity carried,* shall have stenciled on both sides, in letters three inches in size, adjacent to the car number, the words "Leaky tank. Do not load until repaired," (etc.—no other changes).

Reason—To clarify the intent that this requirement applies to all classes of leaky tank cars.

Rule 3

The committee recommends that the effective dates for various requirements in the present rule, as listed below, now set at January 1, 1939, be extended to January 1, 1940:

Section (b), Paragraph (7)—Metal badge plate showing dimensions of brake levers.

Section (b), Paragraph (8)—Bottom-rod and brake-beam safety supports.

Section (b), Paragraph (9)—Braking power

Section (r), Paragraph (3)—Hatch covers to be secured by hinges.

Also, that the effective date of Paragraph (17) of Section (t) of this rule, requiring that plugs in tanks of tank cars must be of the solid type, now set at August 1, 1938, be extended to August 1, 1939, with proviso that no further extension beyond the latter date will be granted.

Reason—The present situation justifies these extensions. The requirement for solid type plugs in tanks of tank cars was incorporated in the 1938 Code as a safety measure, to comply with revised I.C.C. Specification 103, and extension of effective date beyond August 1, 1939, would not be justified.

The committee recommends that no further extension beyond January 1, 1939, be granted for effective date of requirement appearing in Paragraph (8) of Section (a) of this rule, prohibiting the acceptance of cars in interchange bearing advertisements of any shipper, consignee or product.

Reason—Sufficient time has elapsed to permit compliance with this requirement. This recommendation has the approval of the Operating-Transportation Division.

The committee recommends that no further extension beyond January 1, 1939, be granted for effective date of Paragraph (8) of Section (t) of this rule, prohibiting the acceptance in interchange of tank cars having head-block anchorage.

Reason—This requirement has been in the rules for a number of years and sufficient time has elapsed to permit compliance therewith and that no further extension of effective date is justified.

The committee recommends that second paragraph of Section (a) of this rule be modified and a new note added, as follows:

Proposed Form—(a-2) Air brakes, location of retaining valves in accordance with A.A.R. Standard, required on all cars built new or rebuilt on or after August 1, 1933. *In interchange.*

Note—It is recommended that when cars built new or rebuilt prior to August 1, 1933, receive Class I general repairs, retaining valves be located in accordance with A.A.R. Standard.

Reason—Sufficient time has elapsed to make this provision a general interchange requirement. Note added to expedite the use of the standard location on cars built prior to August 1, 1933.

The committee recommends that third paragraph of Section (a) of this rule be modified as follows:

Proposed Form—(a-3) Air brakes, including centrifugal dirt collector, in addition to above details, required on all cars built new or rebuilt on or after August 1, 1929. *In interchange.*

Reason—Sufficient time has elapsed to make this provision a general interchange requirement.

The committee recommends that fifth paragraph of Section (a) of this rule be eliminated.

Reason—Rules 19 and 60 cover.

The committee recommends that fourth paragraph of Section (b) of this rule be modified as follows:

Proposed Form—(b-4) Brake beams on all cars built new on or after September 1, 1909, and on all cars rebuilt on or after July 1, 1928, must be hung from the trucks. *In interchange.*

Reason—Sufficient time has elapsed to make this provision a general interchange requirement.

The committee recommends that fifth paragraph of Section (b) of this rule be modified as follows:

Proposed Form—(b-5) Brake-beam hangers and brake-beam hanger pins conforming to A.A.R. Recommended Practice, or equivalent in strength, required on all cars built new or rebuilt on or after January 1, 1930. *In interchange.*

Reason—Sufficient time has elapsed to make this provision a general interchange requirement.

The committee recommends that seventh paragraph of Section (b) of this rule be modified as follows:

Proposed Form—(b-7) Brake levers: Metal badge plate meeting A.A.R. requirements and fastened to underframe in an accessible location, *preferably near air-brake cylinder and on the same side of car,* showing dimensions of brake levers standard to car, required on all cars built new or rebuilt on or after August 1, 1929. Effective January 1, *1940,* the foregoing requirement will also apply to all cars. From owners.

Reason—To facilitate checking of rods and levers.

The committee recommends that new eleventh and twelfth paragraphs be added to Section (c) of this rule and included in the next supplement, to read as follows:

Proposed Form—(c-11) *Couplers, former standard or temporary standard having 5-in. by 5-in. shanks, prohibited, effective January 1, 1940, on all cars. From owners.*

(c-12) *Couplers, former standard (except type D) or temporary standard having 5-in. by 7-in. shanks, prohibited, effective January 1, 1942, on all cars. From owners.*

Reason—As recommended by the Committee on Couplers and Draft Gears.

The committee recommends that first and second paragraphs of Section (f) of this rule be combined and modified to read as follows:

Proposed Form—(f-1) Flat cars must be equipped with stake pockets 4 in. wide by 5 in. deep and have the side stake pockets spaced minimum 2 ft. and maximum 4 ft. *In interchange.*

Note.—A tolerance of ¼ in. in either dimension of the stake pocket is permissible on flat cars built prior to July 1, 1928.

(f-2) Vacant.

Reason—To shorten and simplify the rule, as dates are now unnecessary. Sufficient time has elapsed to make this provision a general interchange requirement.

The committee recommends that first paragraph of Section (h) of this rule be modified as follows:

Proposed Form—(h-1) Handbrake arrangement must be efficient on all cars. On all cars built new or rebuilt *between* March 1, 1925, *and January 1, 1937,* the braking power shall conform to the standard adopted in 1924, *or car equipped with geared hand brake complying with the requirements of the A.A.R. Specifications for Geared Hand Brakes.* In interchange.

Reason—To eliminate confliction with Paragraph (h-3).

The committee recommends that second paragraph of Section (j) of this rule be eliminated in the next supplement.

Reason—As directed by the General Committee.

The committee recommends the addition of a note to fourth paragraph of Section (r) of this rule, as follows:

Proposed Form—(r-4) Refrigerator cars, ventilated type, built new or rebuilt on or after January 1, 1935, must have hatch plugs secured by hinges. From owners.

Note.—It is recommended that when ventilated type refrigerator cars built new or rebuilt prior to January 1, 1935, receive Class I general repairs, hatch plugs be secured by hinges.

Reason—To expedite the use of hinged hatch plugs on cars built prior to January 1, 1935.

The committee recommends the addition of a note to fifth paragraph of Section (r) of this rule, as follows:

Proposed Form—(r-5) Receptacle for accommodation of defect, information and joint evidence cards, in accordance with A.A.R. Recommended Practice Specification, required on all cars built new or rebuilt on or after January 1, 1937. From owners.

Note—It is recommended that when cars built new or rebuilt prior to January 1, 1937, receive Class I general repairs, defect card receptacle as described above be applied.

Reason—To expedite the use of defect-card receptacles on cars built prior to January 1, 1937.

The committee recommends that next to last sentence in third paragraph of Section (s) of this rule, reading *"Cars built prior to 1895 may be stenciled 'built prior to 1895' or bear badge plate giving this information,"* be eliminated.

Reason—It is conservative to conclude there are no cars in interchange service built prior to 1895.

The committee recommends that third paragraph of Section (t) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—(t-3) Truck side frames, cast-steel, secondhand, must not be substituted for any other side frames (cast-steel, pressed or structural steel or arch bar type) unless entirely free from cracks, fractures, excessive wear, excessive corrosion, or porosity, or welds not performed and marked strictly in accordance with Rule 23. Secondhand side frames of older designs, such as those having T- or L-section compression or tension members, must be confined to owner's equipment and then only when such frames have been removed from same owner's equipment, or for replacements in kind on foreign cars, *and providing further that such truck frames have not been welded.*

Reason—To prohibit application of welded L- and T-types of side frames, as a safety measure, as recommended by the General and Car Construction Committees.

The committee recommends that tenth paragraph of Section (t) of this rule be modified as follows:

Proposed Form—(t-10) Tank cars: Permanent metal holders designed to provide for secure attachment, easy application, removal, or reversal of the placards prescribed by the Interstate Commerce Commission Regulations for application to tank cars, required on all new cars, on new underframes to which tanks are applied, *on* all cars receiving general repairs on or after January 1, 1932, *and on all cars after January 1, 1943,* except cars used exclusively for the transportation of non-inflammable, non-corrosive, non-poisonous and non-dangerous commodities for which the I.C.C. Regulations do not require placards. From owners.

Reason—A reasonable time limit should be established within which all tank cars requiring metal placard holders must be so equipped.

The committee recommends that second paragraph of Section (u) of this rule be modified as follows:

Proposed Form—(u-2) Underframe, etc.: No car of all-wood construction (now defined as Class F under Rule 112) will be accepted. *In interchange.*

Reason—Sufficient time has elapsed to make this provision a general interchange requirement.

Rule 4

The committee recommends that present note following Section (d) of this rule be modified and a new second note added, effective August 1, 1938, as follows:

Proposed Form—(d) Other house cars—When sheathing is split or broken, or when raked into tongue.

Note *1*—It is understood that *adjoining* raked sheathing if not split or broken will not be cardable unless raked into tongue, except that on refrigerator cars sheathing raked to bottom of bead *but not into tongue* will also be cardable *if it adjoins sheathing raked into tongue, broken or split.*

Note 2—Special type hopper cars having permanent fixed roofs (A.A.R. Class LO) shall be considered as house cars in so far as defect carding under this rule is concerned.

Reason—To more clearly define cardable raked wood sheathing and specifically classify the Class LO hopper car for defect carding purposes.

Rule 5

The committee recommends that second paragraph of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—To justify bill, repairs authorized by defect card must be made within two years from date of first receipt of car on home line, except wrong repairs, which must be corrected within nine months from date of first receipt of car on home line. However, if wrong repairs of brake hangers, bolts in place of rivets, or wrong size bolts or pins, are not corrected within nine months from date of first receipt of car on home line, *or not corrected on any line* within one year from date of such wrong repairs, *counterbill* for correcting same is prohibited.

Reason—To clarify the intent that the requirement applies to correction of wrong repairs by foreign lines as well as by car owner. Car owner should absorb expense of correction after these details have given the specified length of service.

Rule 7

The committee recommends that fourth paragraph of Section (2) of this rule be modified to read as follows:

The actual weight of forgings, structural or pressed-steel shapes and weight and kind of castings must be shown on original record in space provided, except where weight of same is accurately determined by definite description or *where arbitrary weight is specified in Rule 101 tables.*

Reason—Unnecessary to record actual weights in such cases.

Rule 9

The committee recommends that sixth item in this rule be modified as follows:

Proposed Form—Brake shoe keys, applied.—*"K-34" (indicating 1934 A.A.R. Standard)* must be shown to justify charge.

Reason—To simplify the writing of billing repair cards.

Rule 16

The committee recommends that a new third paragraph be added to this rule (present third paragraph to be relocated as new fourth paragraph), to read as follows:

When effecting betterments or in application of new standards, a car owner may stencil car "New Std." (new standard) for any part of car (such as wheels, brake beams, etc.) while making partial change or without making any change. During the transition period handling line has the option of applying parts in kind or substituting the new standard. However, when such new standard details are removed account defective, they must be renewed in kind or with permissible substitutes.

Reason—To permit application of betterments or new standards as individual parts become defective.

Rule 17

The committee recommends that first paragraph of Section (c) of this rule be modified as follows:

Proposed Form—(c-1) In replacing couplers, 9⅛-in. butt may be substituted for 6½-in. butt when used with A.A.R. standard yoke in substitution for non-A.A.R. standard yoke.

Reason—Present wording technically prohibits substitutions which Section (c-2) permits as correct.

The committee recommends that fourth paragraph of Section (c) of this rule be modified and Interpretation No. 24 eliminated, as follows:

Proposed Form—(c-4) Equipment markings (for couplers, draft gears, etc.) are not required; however, the rules do not prohibit application of such markings by car owner. If car bears previous markings for couplers, in the event of first application of D or E type coupler; *or if A.A.R. approved draft gear is applied in place of non-approved or obsolete type of draft gear, and car bears previous markings for latter gears;* such markings must be changed to correspond with coupler *or draft gear* applied (for the particular end, A or B, or both ends, as the case may be) for which a charge of ½ hour may be made. In event of failure of repairing line to correct markings under such circumstances, defect card shall be issued for ½ hour labor to cover.

(Inter. 24) Vacant.

Reason—To protect car owner in such cases.

The committee recommends that Section (d) of this rule be modified as follows:

Proposed Form—(d) Bolts substituted for rivets, where rivets are the standard of the car, are considered as improper repairs, except where used in securing ladders, ladder treads, handholds, sill steps and uncoupling-lever brackets, exclusive of the tank, or metal jacket on tank, of tank cars, also for securing *coupler and draft gear* supports on tank cars; bolts should not be used for securing safety appliances on the tank or metal jacket of tank. (Etc., no other change).

Reason—To clarify the intent.

The committee recommends that a new fifth note be added to Section (e) of this rule and included in the next supplement, to read as follows:

Note 5—In the absence of stenciling to indicate type of brake beam standard to car, the majority class of beams under car will be considered as the standard to the car, or if two beams under car are of one capacity and two of another capacity, the heavier type beam will be considered as the standard to the car.

Reason—As a guide to repairing line when renewing brake beams.

The committee recommends that a new sixth note be added to Section (e) of this rule and included in the next supplement, to read as follows:

Note 6—Brake beams having more than one class number cast on strut shall be classified under the lowest class marking for charge and credit purposes.

Reason—Conflicting class number markings on brake beams are not contemplated under the A.A.R. specifications.

The committee recommends that fifth paragraph of Section (i) of this rule be modified as follows:

Proposed Form—(i-5) Where one type of non-approved friction draft gear is substituted for another type of non-approved gear, defect card *is not required if the gear applied conforms to the one removed as to sill spacing and coupler-pocket limits; but if it does not so conform, defect card must be issued for labor and material of correcting.*

Reason—It appears to be unnecessary labor and expense to remove one type of serviceable non-approved draft gear in order to replace it with another non-approved type, where sill spacing and coupler pocket limits properly conform.

The committee recommends that Section (k) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—(k) Extra heavy pipe fittings may be substituted for single-weight type, or vice versa, as correct repairs, and charge based on type of fittings applied, *except for hand rails on tank cars where charge must be confined to single-weight pipe and pipe fittings if standard to car.*

Reason—It is felt that single-weight pipe and fittings for hand rails on tank cars are a proper exception to this requirement.

Rule 18

The committee recommends that this rule be modified, effective August 1, 1938, to read as follows (bracketed "Owner Responsible"):

Rule 18. *Gage Limits For and Methods of Gaging Couplers.*

(a) *Worn Limit—Repairs (Without Removing Coupler From Car).*

(1) Couplers, types D and E, with distance between point of knuckle and guard arm exceeding 5 5/16 in. as measured by gage (Fig. *A*, present Rule 18), must have the defective part or parts renewed to bring coupler within *required* gage *of 5⅛ in. as measured by gage (Fig. B, present Rule 18). If coupler is out of gage, the body must not be renewed unless the application of secondhand, reconditioned or new knuckle, lock and pin, any or all, will not bring it within the required gage of 5⅛ in.*

(2) Couplers, other than types D and E (M. C. B.-1904 contour), with distance between point of knuckle and guard arm exceeding 5⅛ in., measured perpendicularly to guard arm (Fig. *B, present Rule 18*), must have the defective part or parts renewed to bring coupler within *required* gage *of 5⅛ in.*

Note.—The 5⅛-in. limit referred to should not be confused with the 4⅞-in. limit applicable to reclamation of knuckles as covered on pages 479-506 of the 1932 Mechanical Division Proceedings and referred to in Rule 23.

(b) *Application—Secondhand or Reconditioned Couplers.*

(1) *Coupler bodies, types D and E, secondhand or reconditioned, whether applied separately or as part of a complete secondhand coupler, regardless of any new, reused, reconditioned, or other secondhand parts (knuckle, lock and pin, any or all)*: Distance from point of knuckle to guard arm must not exceed 5 in. *as measured by gage.* [Fig. B, present Rule 18, Fig. 1 in this report.—Editor.]

(2) In the application of secondhand or reconditioned coupler bodies or complete coupler, the shank shall be not less than 21 in. in length from striking horn to crest of worn surface of butt, nor less than 3⅞ in. from pulling (rear) surface of horizontal key slot to crest of worn surface of butt, established with parallel

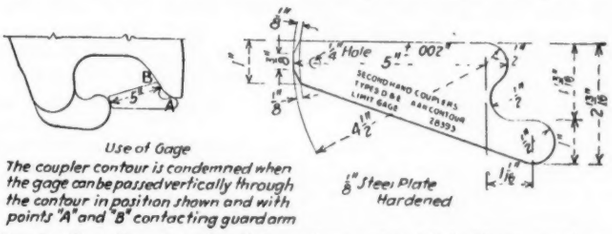

Use of Gage
The coupler contour is condemned when the gage can be passed vertically through the contour in position shown and with points "A" and "B" contacting guard arm
Hole
SECONDHAND COUPLERS TYPES D & E LIMIT GAGE & CONTOUR 28393
⅜" Steel Plate Hardened

Fig. 1—Gage for measuring distance from point of knuckle to guard arm

straight edges; otherwise, such body shall be charged at scrap value. (See Fig. *D, present Rule 18.*) Coupler bodies having such minimum dimensions shall not be removed from cars for these defects alone, but if removed for other reasons and are otherwise in serviceable condition same shall be credited at secondhand value, with no allowance for expense of reclamation.

(c) *Coupler Bodies—Removal from Foreign Cars.*

Coupler bodies. Types D and E, with cracks in knuckle side wall back of knuckle tail, shall not be removed from foreign cars, unless

(1) Such crack extends beyond an area 3 in. above and 3 in. below the horizontal center line of knuckle side wall and 7½ in. back of front edge of knuckle side wall. *When crack extends beyond this area, the coupler body is condemned and must not be reclaimed by welding.* [This area is shown shaded in Fig. C of the Report on Couplers and Draft Gears.—Editor.]

(2) Section is broken out within this prescribed area whose greatest dimension exceeds three inches.

Reason—As recommended by the Committee on Couplers and Draft Gears and to harmonize with Specification for Secondhand Couplers adopted by letter ballot.

Rule 19

The committee recommends that item reading *"Pressed steel journal boxes, except when replaced in kind"*, be eliminated from this rule (which specifies material that must not be used in making repairs to foreign cars), effective August 1, 1938.

Reason—To conform with change in Paragraph (j-2) of Rule 3.

The committee recommends that a new item be added to this rule, effective August 1, 1938, to read as follows:

Cast-steel truck side frames having 'T'- or 'L'-section compression or tension members, which have been welded.

Reason—To prohibit the application of such welded side frames to foreign cars, as recommended by the General and Car Construction Committees.

The committee recommends that a new item be added to this rule, effective August 1, 1938, to read as follows:

Cast-iron wheels below nominal weight or having no cast weight.

Reason—To be consistent with other prohibitions and harmonize with Rule 83.

Rule 22

The committee recommends that sentence *"Draft timbers must not be spliced"*, be eliminated from first paragraph of this rule, account obsolete construction.

Rule 23

The committee recommends the addition of a new item to Section II of this rule, which is headed "Welding cracks or fractures (by autogenous or other method) will not be permitted on the following", effective August 1, 1938, to read as follows:

Cast-steel truck side frames having 'T'- or 'L'-section compression or tension members.

The committee recommends modification of seventh item and the addition of a new eleventh item under Section III of this rule, which is headed "Building up worn surfaces will be permissible on the following", effective August 1, 1938, as follows:

Proposed Form—†Truck sides, bolsters and column castings, *other than truck sides having T- or L-section compression or tension members.*

No welding of any kind, or building up of worn surfaces, is permitted on cast-steel truck side frames having T- or L-section compression or tension members.

The committee recommends modification of second item under Section IV of this rule, which is headed "Welding cracks or fractures will be permitted on the following", effective August 1, 1938, as follows:

Proposed Form—*Cast-steel truck sides, bolsters and transoms, *other than truck sides having T- or L-section compression or tension members.*

Reason—To prohibit welding of L- and T-types of side frames, as a safety measure, as recommended by the General and Car Construction Committees.

Note—Figure 5 of this rule, illustrating welds made in journal box of 'T'-section truck side frame, will be revised to show the 'U'-section side frame.

Rule 32

The committee recommends that a new last paragraph be added to this rule, effective August 1, 1938, to read as follows:

11. Damage to containers on container cars will be subject to the same rules as the carrying car where damage occurs at same time and is associated with handling- or delivering-line damage to the car. However, containers missing from cars in interchange are not cardable. In the case of exterior fire damage to a container where no evidence of same appears on the car, if handling line has knowledge of same occurring while in its possession, it should assume responsibility.

Reason—To provide protection for containers of container cars.

Rule 49

The committee recommends that last sentence of Paragraph (a) of this rule be modified as follows:

Proposed Form—Where receptacle is used, same should be in accordance with A. A. R. Recommended Practice specification, applied one per car, preferably located as follows, or *as near center of car as possible but not more than 24 in. from side sill, to provide easy access and conserve time in transportation yards: However, in no case should it be located* more than 5 ft. 6 in. from top of rail.

Reason—To provide for more uniform location of receptacle.

The committee recommends that note following third paragraph of Section (a) of this rule be modified as follows:

Proposed Form—Note—Suitable receptacle referred to above may not be *initially* applied to *or relocated on* foreign cars except with consent of *car* owner.

Reason—To clarify the intent and authorize renewal in kind where standard to car.

The committee recommends that Paragraph (c) of this rule be modified as follows:

Proposed Form—(c) All-steel and steel sheathed refrigerator cars not equipped with cardboards for special explosive and other placards, as required by the I. C. C. Same to be located on side doors and both ends of car. *This requirement also applies to ends of box and refrigerator cars having metal ends and wooden sides.* (On refrigerator cars, they shall be located adjacent to side doors but must not be concealed when doors are in open position.) Size not to be less than 16 by 24 in.

Reason—As required by the I. C. C. Regulations when such cars are used for the transportation of explosives and other dangerous articles.

Rule 59

The committee recommends that last paragraph of this rule be modified by the addition of italicized portion below, and new interpretation added, to read as follows:

Missing steam-heat hose or air signal hose, complete, *also missing end steam valves and metallic steam connectors,* where cars are stenciled that they are so equipped.

(Inter. 3) Q.—Where elbow or other pipe fitting is used in place of the end steam valve (on car stenciled for the latter), is this a delivering line defect in interchange on basis of missing end steam valve, or is it considered as wrong repairs for which only the road applying is responsible to car owner?

A.—In such case it should be considered as delivering line defect in interchange on basis of missing end steam valve.

Reason—To protect car owner where cars are stenciled for these items.

Rule 64

The committee recommends that note following this rule be modified in the next supplement, as follows:

Proposed Form—Note—It will be understood that the above provision also applies when such bolts are renewed. *Joint evidence as per Rule 12 must be used to establish claim of wrong repairs.*

Reason—To clarify the intent as to handling of such cases.

Rule 76

The committee recommends that this rule be modified to read as follows, changes from the present rule being italicized:

Rule 76. Tread worn hollow—cast-iron and *one-wear* cast-steel wheels: If the tread is worn so that projection on under side of gage does not come in contact with tread of wheel (see Fig. 4-D). See paragraph 110 and Fig. 92 in Wheel and Axle Manual.

Tread worn hollow—wrought-steel *and multiple-wear cast-steel wheels:* If height of flange is 1½ in. or over, as measured with standard steel-wheel gage (see Fig. 128 in Wheel and Axle Manual), or approved equivalent.

Reason—Gage shown in Figure 128 in the Wheel and Axle Manual is not applicable to the one-wear cast-steel wheel, but is applicable to multiple-wear cast-steel wheels; as recommended by the Committee on Wheels.

Rule 82

The committee recommends that first paragraph of this rule be modified to refer to remount limits a, b, c *and d,* and that a new paragraph (d) be added to read as follows:

(d) Rim broken: Cast-iron or cast-steel wheels removed from service account condition of axle or mate wheel, shall be classed as scrap if width of tread, measured from flange at a point 5/8 in. above tread, is more than 3½ in. but not more than 3¾ in. and the fracture inclines outwardly.

Reason—Wheels having such defect should not be remounted, as recommended by the Committee on Wheels.

Rule 86

The committee recommends that second and third paragraphs of Section (b) and last paragraph of Section (d) of this rule be eliminated.

Reason—Account obsolete. Rule 3 requires A. A. R. Standard axles on all cars in interchange.

Rule 87

The committee recommends that third sentence in Paragraph (a) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—However, if wrong repairs of brake hangers, bolts in place of rivets, or wrong size bolts or pins, are not corrected within nine months from date of first receipt of car on home line, *or not corrected on any line* within one year from date of such wrong repairs, *counterbill* for correcting same is prohibited.

Reason—To harmonize with changes in Rules 5 and 94.

Rule 88

The committee recommends that first paragraph of this rule be modified as follows:

Proposed Form—Rule 88. In order that repairs of owner's defects may be expedited as fully as possible, foreign or private

line cars may be repaired by the handling line by using material from their own stock instead of ordering from owner special material not specified in last paragraph of Rule 122, in which event the repairing line must issue its defect card for the labor only of correcting such improper repairs, and defect card should be so marked; except *as otherwise provided in Rule 17, and in cases where* the following substitutions are made defect card must be issued for material and labor of correcting, regardless of responsibility for the repairs:

Reason—Account change in Rule 17, Paragraph (i-5).

Rule 94

The committee recommends that second sentence of first paragraph of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—However, if wrong repairs of brake hangers, bolts in place of rivets, or wrong size bolts or pins, are not corrected within nine months from date of first receipt of car on home line, *or not corrected on any line* within one year from date of such wrong repairs, *counterbill* for correcting same is prohibited.

Reason—To harmonize with changes in Rules 5 and 87.

Rule 98

The committee recommends that first paragraph of Section (c) of this rule be eliminated.

Reason—Obsolete. Rule 3 requires A.A.R. Standard axles on all cars in interchange.

The committee recommends that reference in fifth paragraph of Section (c) of this rule to Rule 70 (c), be modified to refer to "Rules 70 (c), *73 (a) and 83,*" to harmonize with the latter rules.

Rule 101

The committee recommends that note preceding Item 69 of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—Note—The following prices for extra-heavy pipe fittings may be charged, regardless of kind of fittings removed, *except for hand rails on tank cars where charge must be confined to single-weight fittings if standard to car.*

Reason—Account change in Section (k) of Rule 17.

The committee recommends that Items 201, 202 and 203, which specify prices for non-A.A.R. axles, be eliminated, account absolete. Rule 3 requires A.A.R. Standard axles on all cars in interchange.

The committee recommends that a new third note be added following Item 213 of this rule, effective August 1, 1938, to read as follows:

Note 3—Brake beams having more than one class number cast on strut shall be classified under the lowest class marking for charge and credit purposes.

Reason—Conflicting class number markings on brake beams are not contemplated under the A.A.R. specifications.

The committee recommends that second sentence of Friction Draft Gear Note, preceding Item 250 of this rule, be eliminated.

Reason—Account changes in Rules 17 and 88.

Rule 104

The committee recommends that Sections (a), (b), (e), (f) and (l) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—(a) (1) Secondhand A.A.R. type E couplers of rigid, swivel or radial design, shall be charged and credited at 75 per cent of value new. Credit shall be allowed for all parts of such couplers.

(2) Secondhand A.A.R. type D couplers of rigid, swivel or radial design, shall be charged and credited at *60 per cent of* value new (except that the swivel yoke, butt casting and pin or radial butt casting, shall be charged and credited at 75 per cent of value new). Credit shall be allowed for all parts of such couplers.

(3) Secondhand former standard or temporary standard couplers or parts of same shall be charged and credited at *30 per cent* of value new. Etc.

(b) Secondhand swivel yokes, butt castings and pins or radial butt castings; also, secondhand cast-steel yokes of other types having 24⅝-in. pocket spacing and secondhand two-key forged yokes having 24⅝-in. pocket spacing, designed for 1½-in. by 6-in. horizontal cross keys; shall be charged and credited at 75 per cent of value new.

(e) (Eliminate.)

(f) In the case of missing material under Rule 95, and permissible substitutions are made per Rule 17, car owner may be charged or credited with any difference between value of new or secondhand material applied and the secondhand value of missing material. Etc.

(l) (7) Coupler yokes, except as provided in Section (*b*).

Reason—To adjust secondhand allowance for older types of coupler commensurate with the expense of reclamation, as recommended by the Committee on Couplers and Draft Gears.

Rule 107

The committee recommends that the wording of Item 243 of this rule be modified as follows:

Proposed Form—243. Stenciling car or altering stenciling, to show A.A.R. type D or E coupler applied *or approved draft gear applied,* per car, net.

Reason—Account change in Rule 17.

Rule 108

The committee recommends that the following item be added to Section (a) of this rule, effective August 1, 1938: *Turnbuckles, tightened (other than body truss rods).*

Reason—It is felt no charge should be permitted for this operation.

Rule 112

The committee recommends that seventh paragraph of Section B of this rule be modified as follows:

Proposed Form—(B-7) A steel superstructure frame *house or open-top* car (*Class B*) is a *steel underframe* car having *side-sill members, top side members, uprights and diagonal upright braces, all steel and all* riveted *or welded* together.

Reason—To more clearly define this type of car and indicate its application to certain classes of open-top cars as well as house cars.

Passenger Car Rules

Rule 4

The committee recommends that the effective date of second paragraph of this rule, with reference to equipping all-steel or steel-underframe cars with cardboards or suitable receptacle for the accommodation of defect and joint evidence cards, now set at January 1, 1939, be extended to January 1, 1940.

Reason—The present situation justifies this extension.

Rule 7

The committee recommends that Paragraph (4) of Section (f) of this rule be modified to read as follows, changes from the present rules being in italics:

(f-4) Tread worn hollow—cast-iron and *one-wear* cast-steel wheels: If the tread is worn so that projection on under side of gage does not come in contact with tread of wheel. (See Fig. 4-D of freight code).

Tread worn hollow—wrought-steel *and multiple-wear cast-steel* wheels: If height of flange is 1½ in. or over, as measured with standard steel-wheel gage (see Fig. 128 in Wheel and Axle Manual), or approved equivalent.

Reason—Gage shown in Fig. 128 in the Wheel and Axle Manual is not applicable to the one-wear cast-steel wheel, but is applicable to multiple-wear cast-steel wheels; as recommended by the Committee on Wheels.

The committee recommends that Paragraph (1-a) of Section (h) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—(a) Such crack extends beyond *the shaded* area shown in Figure *D* of Freight Rule 18 (3 in. above and 3 in. below the horizontal center line of knuckle side wall and *7½ in.* back of front edge of knuckle side wall). *When crack extends beyond the shaded area, the coupler body is condemned and must not be reclaimed by welding.*

Reason—To harmonize with change in Freight Rule 18, as recommended by the Committee on Couplers and Draft Gears.

Rule 8

The committee recommends that a new Item 17 be added to Section (a) of this rule (Delivering line defects), to read as follows:

(17) *Raked sheathing to be cardable if raked to extent shown in Freight Rule 4 for refrigerator cars.*

Reason—It is felt the same limits as provided in Freight Rule 4 should apply for carding raked sheathing on passenger equipment cars.

Rule 15

The committee recommends that a new third paragraph be added to this rule, to read as follows:

In replacing generator belts or brake shoes on foreign cars, new material must be used to justify bill.

Reason—It is felt new material should be applied in such cases to warrant charges versus car owner.

Rule 18

The committee recommends that this rule be modified, effective August 1, 1938, as follows:

Proposed Form—Rule 18. Settlement for passenger equipment cars destroyed shall be based on cost of reproduction in kind at date of destruction. Depreciation shall be *computed* at 3 per cent per annum (straight depreciation basis) from date originally built, *except that depreciation on that portion of the cost charged to capital account for air conditioning system on cars so equipped shall be computed at 5 per cent per annum from date of installation.* Depreciation shall not exceed 80 per cent of reproduction cost.

Note.—In cases where air-conditioning system was installed coincident with construction of car, the amount charged to capital account for such installation may be estimated.

Reason—To provide an equitable settlement basis for the detail specified.

The report was signed by W. H. Flynn (chairman), general superintendent motive power and rolling stock, New York Central; J. P. Morris (vice-chairman), Atchison, Topeka & Santa Fe; J. A. Deppe, superintendent car department, Chicago, Milwaukee, St. Paul & Pacific; L. Richardson, mechanical assistant to vice-president and general manager, Boston & Maine; M. F. Covert, general superintendent equipment, General American Transportation Corp.; G. E. McCoy, assistant general superintendent car equipment, Canadian National; A. E. Smith, vice-president, Union Tank Car Company; R. G. Bennett, general superintendent motive power, Pennsylvania.

The report was adopted.

S. P. Streamline 4-8-4 Locomotives

(*Continued from page 246*)

walls and reduced hub diameter. They are fitted with the Locomotive Finished Material Company's bronze packing rings.

The valve-chamber bushings and bull rings are of Hunt-Spiller gun iron and the valves are fitted with Hunt-Spiller duplex sectional valve packing rings.

Both lots of locomotives are equipped with the Alco power reverse gear. On the later locomotives, however, the increase in the diameter of the driving wheels required that the reverse shaft be located back of the link, whereas in the earlier locomotives it was located directly over the front drivers in front of the link.

In other respects the running gear and motion work are essentially the same on both lots of locomotives. The rods and valve motion have Alemite-fitted grease cups and the guides are lubricated from the force-feed cylinder lubricators.

The streamlining of these locomotives is simple and effective. It consists essentially in a skyline casing over the top of the boiler within which are concealed the steam dome, sand box, safety valve and turrets. The front end has been changed relatively little from conventional design beyond the fairing the headlight casing into the center of the smokebox door. The pilot is covered, and from the sides of the pilot, sweeping in a broad curve over the sides of the steam chest, is a deep skirt which extends along the side of the locomotive below the running board to the cab. The remainder of the effect has largely been obtained by the use of red and yellow colors with striping in aluminum. The air compressors are mounted on the side of the boiler and the bell is placed below the smokebox, from which it is supported.

Partial List of Equipment and Materials on the Second Lot of Southern Pacific 4-8-4 Type Locomotives

Bed casting; engine and trailer trucks; Boxpok driving wheels	General Steel Castings Corp., Eddystone, Pa.
Tires	Standard Steel Works Co., Burnham, Pa.
Lateral cushioning device	American Locomotive Co., New York
Driving-box cellar	Franklin Railway Supply Co., Inc., New York
Coupler pocket	National Malleable and Steel Castings Co., Cleveland, Ohio
Radial buffer	Franklin Railway Supply Co., Inc., New York
Throttle, multiple	American Locomotive Co., New York
Superheater; steam dryer	Superheater Company, New York
Injectors and injector checks; safety valves	Nathan Manufacturing Co., New York
Feedwater heater	Worthington Pump & Machinery Corp., Harrison, N. J.
Speed recorder	Valve Pilot Corporation, New York
Steam gage	Locomotive Equipment Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Air brakes	Westinghouse Air Brake Company, Wilmerding, Pa.
Steam heat	Vapor Car Heating Co., Inc., Chicago
Water gage	Nathan Manufacturing Co., New York
Whistle, steam	Locomotive Equipment Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Whistle, pneumatic	The Leslie Co., Lyndhurst, N. J.
Bell ringer	Transportation Devices Corp., Indianapolis, Ind.
Sander	Viloco Railway Equipment Co., Chicago
Dynamo and headlights	Pyle-National Co., Chicago
Staybolt iron	Ulster Iron Works, Dover, N. J.
Staybolts	Flannery Bolt Co., Bridgeville, Pa.
Smokebox hinge	The Okadee Company, Chicago
Valve-chamber bushings and bull rings	Hunt-Spiller Manufacturing Corporation, Boston, Mass.
Piston-rod and valve-stem packing	Paxton-Mitchell Co., Omaha, Neb.
Reverse gear	American Locomotive Co., New York
Lubrication	Nathan Manufacturing Co., New York
Flange lubricator	Lima Locomotive Works, Lima, Ohio Alemite Div. Stewart-Warner Corp., Chicago
Flexible joints, McLaughlin	Franklin Railway Supply Co., New York
Tank valve	Crane Co., Chicago
Tender:	
Frame	General Steel Castings Corp., Eddystone, Pa.
Trucks, truck side frames and boxes	Buckeye Steel Castings Co., Columbus, Ohio
Clasp brake	American Steel Foundries, Chicago
Wheels	Edgewater Steel Co., Pittsburgh, Pa.
Draft gear	W. H. Miner, Inc., Chicago

The Tenders

The tenders of the two orders of locomotives are of the same capacity, carrying 6,010 gallons of fuel oil and 22,000 gallons of water. They are rectangular in form and are built up on General Steel Castings water-bottom underframes. The trucks are the Buckeye six-wheel type with 7-in. by 14-in. journals.

The locomotives are fitted with the No. 8ET brake equipment and the HSC train brake, and have both steam and pneumatic whistles.

EDITORIALS

Progress in Freight Car Construction

When some basic development in science or an improvement in an art removes certain limitations from which the designer has never before been free there is a natural tendency for him to give free reign to his imagination in counting up all of the useful possibilities which may come from the application of a new material or a new process or a new method. His visualization of the possibilities is almost sure to include some extremes of application, the true economic value of which can only be determined by the most careful study. Indeed actual trial and experience is usually essential before the boundaries of the true field for the application of the new developments can be clearly established.

The possibilities for the application of new materials and new methods in car construction is a case in point. At the outset of the availability of the new materials of construction which have become available during the past few years, they were applied in the construction of passenger equipment. The economic objective was weight reduction. Nothing which could increase the extent of weight reduction in connection with the applications of the new materials was overlooked, so that the end result might be the maximum obtainable. The ultimate costs of some of the extreme measures for accomplishing this desirable end, in convenience, in reliability, as well as in dollars and cents, have proved too great in practice, however, and the tendency is now toward a recession in certain aspects of weight reduction.

Somewhat the same situation has been developing with respect to freight cars. Here both new materials and an extension of the welding processes into this field has led to the same urge to accomplish the maximum in weight reduction without regard to the relation of weight to other objectives of a balanced design. Some excellent work has been done in demonstrating the remarkable possibilities both of the new material and of the extended application of welding. To accept these results, however, without a careful study of all of the possible combinations of the old and the new would quite possibly result in failure in the ultimate attainment of that degree of weight saving from which the optimum economic result can be attained.

Real progress is therefore being served by the proposed program announced by the Car Construction Committee in its 1938 report. This involves a cooperative effort of the car builders, the railroads and the manufacturers of special equipment for a thorough study of the comparative possibilities of carbon steel of riveted construction, of alloy steel with a combination of welding and riveting, of alloy steel with the riveting reduced to a minimum, and of carbon steel with a combination of riveted and welded construction. Such a series of studies is bound to be stimulating in the practical advancement in the use of the new materials and in finding the most practicable combination of riveting and welding in car construction.

The Welding of Low-Alloy Steels

The modern high-strength low-alloy steels have been developed to meet specifications calling for 75,000 to 95,000 lb. per sq. in. minimum ultimate strength, together with ease of fabrication and good weldability. The combinations of the alloys in the steels offered by the various steel companies differ widely, but each of them meets these requirements. It is of importance to note that these steels differ from their predecessors in that they may be welded without seriously affecting the metal next to the weld proper. This result is achieved by the use of chromium, manganese or nickel, or some combination of these elements with silicon, vanadium, molybdenum, phosphorus or copper with carbon at a low level. From a fabrication standpoint, it matters little which combination is used, providing the alloy combination is well balanced and the physical properties are attained with carbon at 0.14 per cent or less in the 75,000 lb. per sq. in. grade and 0.22 per cent or less in the 95,000 lb. per sq. in. grade. The alloy content of each of the low-alloy steels is sufficiently low so that no difficulty is found in welding them because the flowing properties and controllability of the weld puddle, when using any of the better standard welding rods or electrodes, are satisfactory for general-purpose welding.

The problem which must be given the most serious consideration involves the air hardening of the steel in the zone adjacent to the weld, which hardening may be definitely correlated with the carbon content and the ultimate strength of the steel. Light-gage steels in the 0.14 per cent carbon class may be classified as full-proof in so far as welding is concerned. However, those steels having higher-carbon contents and an ul-

timate strength not in excess of 95,000 lb. per sq. in., as well as lower-carbon steels of heavy gage, are also being welded satisfactorily when stress relieving is applied. A complete study of the problem of welding low-alloy steels shows that they can be welded as readily as plain carbon steels, providing intelligent welding practice is followed and use is made of modern welding equipment and improved types of welding rods or electrodes.

What Next?

An examination of the files of an early English publication discloses the following quotation: "Yesterday morning, when the six o'clock Birmingham train arrived at the station in Euston-square, a hare was discovered perfectly roasted and nearly consumed in the ash pit of the furnace of the steam engine. The animal, it is supposed, being alarmed, was driven for refuge into this dangerous position."

Bearing out the adage that the first story-teller has no chance in comparison with the last, this yarn about the hare in the English locomotive ash pan is entirely out-classed by the well-authenticated fact that, within recent months, a streamlined fast passenger train from the west arrived at the Chicago terminal with a *fish* in the *locomotive headlight*. Since fish do not fly, at least in the inland territory of the United States, the explanation of this phenomenon is thought to be somewhat as follows: While the train was passing through some mountainous country, an eagle must have collided with the locomotive headlight, broken the glass and deposited its catch, no doubt to the vast disappointment of a nest full of hungry eaglets in some mountain fastness.

In view of the two incidences cited, it may well be asked—what next in the way of live stock will be picked up by some meandering locomotive?

Diesel-Electric Locomotive Progress

In its 1938 report the Committee on Locomotive Construction of the Mechanical Division included statistics concerning the use of the Diesel-electric locomotive by the railways of the United States and Canada which represent facts of sufficient importance to warrant emphasis. The data in the report indicates that since the first Diesel-electric was placed in regular service in 1925 there have been 389 units installed in the 12 succeeding years, 354, or 91 per cent of which, are in service in the switching field and most of the remainder, 27 out of 35 to be exact, are in high-speed passenger road service.

Like the development in the rail-car field the Diesel-electric locomotive has followed a trend toward locomotive units of higher horsepower as well as engine units of increasing horsepower as time has gone by. Up to the end of 1929, when a total of only 40 units had been installed, 27 of these were equipped with 300-hp. engines and 10 units had a total of 600 engine horsepower, although some of these latter were undoubtedly made up of two 300-hp. engines. The year 1930 was the peak year for the installation of 300-hp. engines, after which the number of units utilizing this size of prime mover gradually decreased until, in 1937, the year in which the greatest number of units was installed, there was only one 300-hp. unit built. Coincident with the decline in the use of the lower-powered units came a steady increase in the use of larger units until in the year 1937 of the 155 units installed 87 were of 600 horsepower and 42 were of 900 horsepower and practically all of these 129 locomotives were single-engined units. Sixteen of the locomotives installed in 1937 were of a total horsepower in excess of 1,000, the maximum being 5,400. Prior to 1935 no locomotive of this type had been built with greater total horsepower than 1,330. During the years 1935 to 1937, inclusive, the trend to higher engine horsepower went up into the range including 1,200 and, in one case, 2,000 hp. in a single engine, but, for the most part the units installed embodied the use of 600- and 900-hp. engines, many of which are supercharged. The trend toward the use of multiple-engined locomotive units is indicated by the fact that all the locomotives of 1,800 hp. and over—a total of 19—embody the use of 55 Diesel engines, 43 of which are 900 hp. and the remainder are 1,200 hp., except one engine unit of 2,000 hp.

The report referred to indicates that 40 per cent of all the locomotive units in service were installed in the year 1937 but it is worth while to add to the data included in the report the fact that, from the standpoint of the number of engine units installed and the total engine horsepower, the year 1937 was outstanding. In that year, and two months of 1938, more Diesel engine horsepower was installed in railroad service than had been installed in the 12 previous years. A chart indicating these installations, year by year, appeared on page 223 of the June, 1938, *Railway Mechanical Engineer*.

The last five years has witnessed the introduction of 69 per cent of all the Diesel-powered locomotives now in service and the experience of the railroads has now extended over a sufficient period of time to justify the prediction that this form of power has not only found a very definite place in the transportation field but that its use will continue to expand. The economies in the field of switching service are recognized and as additional installations are made, particularly on the smaller roads, we shall undoubtedly soon reach the point where the maximum economies of Diesel-electric operation may be realized where the steam switcher has been com-

pletely displaced and the cost of maintaining servicing facilities not required for Diesel operation can be eliminated.

The committee is to be commended for the recommendation that the association adopt a uniform report for collecting statistics on the cost of maintenance and operation of Diesel-electric locomotives. Now that this type of power has become firmly established in the railroad field it is of the utmost importance that comprehensive and accurate cost figures be developed for the benefit of the industry at large. It is of equal importance that the data be uniform in character. In the light of past experience it is to be hoped that the roads now operating this type of motive power will cooperate with the committee in developing the statistics of operation in such a manner that all who are interested will recognize that many of the controversial points in such statistics have been taken into consideration with a view to breaking down the resultant data into sufficient detail that it may be related to the varying conditions of service. As the use of Diesel-powered equipment increases the necessity for accurate data on availability and operating costs will become more apparent.

New Books

JIGS AND FIXTURES. *By Fred H. Colvin and Lucian L. Haas. Published by the McGraw-Hill Book Company, Inc., New York. 354 pages, 6 in. by 9 in. Price $3.50.*

This third edition of "Jigs and Fixtures" has been completely revised. It contains an extract from the paper by Prof. J. V. Roe on the economies of jig and fixture design, and, included in the standard practice from such concerns as the Taft-Peirce Manufacturing Company, the Westinghouse Electric & Manufacturing Company, and others, are examples of modern die sets to show their close relation to jigs and fixtures. Standards of jig bushings and of T-slots, tongues and bolts are given as well as many new details of various features to assist the designer in producing efficient and economical work-holding devices.

TESTS OF STRENGTH PROPERTIES OF CHILLED CAR WHEELS. *A report of an investigation conducted at the Engineering Experiment Station, University of Illinois, in cooperation with the Association of Manufacturers of Chilled Car Wheels, by R. E. Richart, R. L. Brown and P. G. Jones. Published as Bulletin No. 294 of the Engineering Experiment Station, University of Illinois, Urbana, Ill. 67 pages, 6 in. by 9 in., paper bound.*

This bulletin reports the results of tests of standard A. A. R. single-plate car wheels which were conducted along lines used in tests made 15 years ago on double-plate wheels, the manufacture of which ceased in 1928; the results of the tests made 15 years ago were reported in Bulletins Nos. 129, 134 and 135 of the University of Illinois Engineering Experiment Station.

The wheels tested in the recent investigation, results of which are reported in Bulletin 294, represented the four standard sizes of A. A. R. single-plate wheels, with some deviations in design and dimensions. Most of the wheels were subjected to a series of tests as follows:

Series 1—The first studies included the determination of the strains developed at various points in the wheel as it was being mounted, or pressed on to a steel axle. At intervals, as the mounting progressed, observations were made of the mounting pressure and of radial and circumferential strains in the wheel hub and plate. A study of the effect of specially ground wheel seats, and of the repeated mounting and removal of wheels was made on part of the wheels. The results of these tests are discussed in Chapter IV.

Series 2—After two wheels had been mounted on an axle, vertical loads were applied to the journals with the wheels supported on 130-lb. standard rails, much as static loads would be applied in service. The increase in wheel strains over those produced in the mounting tests was noted. The loads were applied in increments, producing one, two, three, and four times the normal permissible wheel load. Strains and deflections in the axle were also measured. These tests are discussed in Chapter V.

Series 3—The tests of Series 2 were repeated, with a vertical load equal to the normal permissible wheel load, and with the addition of inward horizontal flange thrusts on each wheel at the point of rail contact. The thrusts employed were 25, 50, 75 and 100 per cent of a normal axle load (axle load equals two wheel loads). The increase in strains and axle deflections was noted. The description and results of the tests are given in Chapter VI.

Series 4—The last group of tests involved the resistance of the wheel rim to loads applied near the edge of the rim. These tests were undertaken in the expectation that their results might throw some light on the causes of the rather numerous rim failures which occur in service on badly-worn wheels. The tests were made on standard wheels, on wheels with profiles simulating a badly-worn tread, on wheels with thickened rims and with special plate designs, and on wheels which had received special heat treatment. These tests were carried to failure of the rims. They are described in Chapter VII.

In comparing freight car wheels of today with those of 15 years ago, considerable improvement in the single-plate design was found. Wheels of today are better in metal, in hardening of tread, and in design. Also, different weights of wheel were found to compare well in design. In studying the breakage of wheel rims on the side away from the flange, thickening the rim, and several other small changes indicated the possibility of further improvements in lengthening wheel life.

THE READER'S PAGE

Proud of Apprentice Training System

To the Editor:

In reading the May and June issues of the *Railway Mechanical Engineer* I was particularly interested in the difficulties experienced by apprentices on other railroads in getting proper training during their apprenticeships.

I am proud to say that our railroad really trains us during our term of apprenticeship, which I, for one, deeply appreciate.

We have a technical training assignment that we are required to qualify on every month of our own time and we have to pass a monthly test. All of our instruction is individual instruction. In this training we are taught fundamental subjects, such as reading blue prints, making freehand shop sketches, principles of layout work by means of geometrical and mechanical drawing, projections, developments, etc., shop arithmetic and shop measurements. After we finish these subjects we have shop practice and layout work in our trade.

We have a shop training schedule that is followed and our foreman rates us every month on our shop work, as compared with an average mechanic on the same work; also on our interest, initiative, craft skill, safety, conduct, etc.

We have an apprentice club, elect our own officers and conduct our own meetings. We meet once a month except in July and August. The principal speakers at these meetings are supervisory officers from the various departments—the operating, transportation, stores and mechanical. They tell us the function of their job and let us ask questions and discuss it. In this way I feel that we learn something about the operation of the other departments that go to make up our railroad, in addition to learning a trade.

Fred Robinson,
Machinist Apprentice, D. & R. G. W.

Machining Piston-Rod Key Slots

To the Editor:

I was much interested in an article in the January issue on machining the key slot in piston rods and crossheads in which "Foreman" describes a method of doing this job on the milling machine. I believe the majority of modern shops still do this job on the drill press and find that it can be done satisfactorily by this method. The method found most convenient is as follows: The slot in the crosshead is carefully laid out and the crosshead clamped to the tilting table of a radial drill press and a line of holes drilled to remove as much metal as possible from the slot. The table is tilted to an angle of 45 deg. to do this job as the slot is at an angle of 45 deg. with the wearing surface of the crosshead. When it is desired to taper the slot, this may be done by shimming up one end of the crosshead. A milling cutter or a rose bit is then placed in the spindle of the drill press and used to cut out the metal left between the row of drilled holes.

To drill the piston rod, the crosshead and piston rod are assembled at the bench and the rod is driven back as far as possible into the taper fit of the crosshead, after which the outline of the slot in the rod is scribed. The rod is then removed from the crosshead and the slot laid out with dividers to drill a suitable line of holes. The slot is set ahead about ½ in. to allow sufficient draw and clearance, and is laid out on both sides of the rod to facilitate setting up on the drill-press table with a combination square and scale. The rod is clamped on the table, the table tilted to give the proper taper to the slot, which is drilled clear through, and the metal between the holes milled out in the drill press at one set-up.

Machine Foreman.

Another Cause of Piston-Rod Failures

To the Editor:

I read with a good deal of interest the letter in the January issue covering the cause of failures of piston rods. I can't agree with this foreman that most failures are caused by the improper machine work done when making the keyways for the draw key.

First, to summarize the draw key and the keyway in the rod, I feel that it is important (1) to machine the keyway in the rod, at the back wall of the fit, squarely in the center of the rod, (2) to locate the keyway the proper distance from the back end of the rod to give the desired strength, (3) to machine the keyway at this point so that it has the proper taper, and (4) to machine the key and the keyway to the same taper. As for the front end of the keyway, it is necessarily ahead of the full width of the key for clearance and the amount of taper at this point does not seem so important. I agree that the keyway for the desired length should be of uniform width and so machined that the possibility of fractures starting from undesirable tool marks be held to a minimum. An important item in the finishing of the keyway is to remove the sharp edges of the keyway after machining by applying a full-length fillet at both the top and bottom of the keyway.

It has been my experience that although many piston-rod failures, have been caused by fatigued metal, the majority of such failures are caused by the lack of a full bearing between the rod and the crosshead. I have seen several methods of making this fit to the crosshead, but in my opinion the best method is to ream the crosshead fit and then set the lathe, in which the piston rod is to be turned, to the exact taper of the reamer. The piston-rod fit should be machined so that when just snugly applied to the crosshead, the rod will enter the crosshead within 1/16 to ⅛ in. of the desired point when pulled in with the key. The two parts should then be lapped together with moderate grinding compound to assure a bearing over the full length of the fit. Without this good bearing the fit is not uniform and an added strain is thrown on the rod, which in time will affect the weakest part of the rod, that is, the keyway.

I might add that I agree fully that only the most experienced mechanic should be allowed to handle work of this type.

Enginehouse Foreman.

Gleanings *from the* Editor's Mail

(The Apprentices Speak)

The mails bring many interesting and pertinent comments to the Editor's desk during the course of a month. Here are a few that have strayed in during recent weeks.

Apprentices Hard Hit

During these days the apprentice does not get a fair deal, in most instances not because the company he works for has no interest in him, but because during intermittent shop operation more attention must be paid to the present and less to the future. An apprentice evening school was organized here with considerable interest and success. However, due to a lay-off of long duration the school had to be abandoned.

Stiffen Requirements for Apprentices

At the present pay scale for railroad apprentices we find at the end of four years a boy has probably earned more than the average young man earns in the four years following his graduation from high school. The point I am trying to stress is this. The railroad companies could afford to be more careful in their requirements for new apprentices. A boy should be required to have a fair knowledge of algebra and geometry, as well as machine drawing experience. For each six months of progress on his apprenticeship, a boy should be required to pass a mechanical examination on various types of machine work, characteristics of various kinds of metal in regard to machinability, etc., as well as locomotive technicalities. In the event a boy fails to pass these exams he, as well as the company, would benefit by his discharge from service, because no man can master a profession to which he is unsuited. Under this system a man, after completing his apprenticeship, may truthfully say, "I am a machinist."

Observations of Special Apprentice

I feel as though I am very fortunate in that I am being trained in a line of work that enables me to do nearly everything of a mechanical nature, although working for this particular road seems to have its bad points also. There is lacking a feeling of security, which is caused by frequent shut-downs, and not knowing when or how long we will work; also due to seniority rules, whereby a great number of men are laid off due to lack of money to repair motive power. There is no place for the regular apprentice when he has served his time, which at present extends well into six years. There must be some solution.

Special Apprentice Makes Suggestions

We "specials" are sent around to different shops on the system to get a speaking acquaintance with as much of the mechanical department as possible inside of three years, working on a definite schedule of so much time here and so much there. This is all supposed to lead us into supervisory positions, starting as gang foreman on completion of the time—provided there are openings for us. We are sent into a shop to spend one or two days with a machinist on one job, and then a day or so on another job—nothing like enough time to really learn the job, but just enough to know that there is such a thing. We are rarely given any opportunity to get acquainted with the problems of the supervisors, which is really the thing we are expected to learn, or at least expected to practice later. I see no reason why we shouldn't spend a great part of our time, at least, with some definite responsibility as acting assistant gang foremen. It would be a much greater incentive to learn the business than just standing around half the time, not knowing enough to help a man, and feeling generally useless. They tell us our time of usefulness will come later, but surely it would do no harm to hurry it up a bit.

Photo by Thomas T. Taber

Servicing Union Pacific "Forty-Niner" at Green River, Wyoming

High Spots in Railway Affairs . . .

Business Trends

Freight car loadings are considered to be one of the best measures of business conditions. The Railway Age insists that on this basis a change in the trend of general business from downward to upward began early in May and loadings up to the latest reports since that time support this view. "Freight loadings," says the Railway Age, "have acted since April much as they did in September, 1932, when they afforded first evidence that the bottom of the depression had been passed. Like the improvement then, the improvement occurring now cannot logically or honestly be attributed to an increase of government lending and spending. But suppose it continues and the Washington propagandists of lending and spending attribute it to their program and get away with it? This will encourage the already widespread and dangerous belief among the people and even among business men that huge government spending is good for business and the people."

Utopia!

"I have noted with pleasure," writes one of the readers of this page, "that the *Railway Mechanical Engineer* has recently devoted some space to the political and economic aspects of the railroad situation, but I wonder if your arguments can do much to reverse the present trend. Some of the more obstreperous groups of railroad employees have more faith in the infallibility of certain labor newspapers than most churchgoers have in the Holy Bible. Many of the readers of these newspapers have been so affected by the incessant harping on watered stock, etc., that no power on earth could produce an argument convincing enough to cause any modification of their convictions. They seem to think that if the present situation can be continued long enough, it will inevitably result in government ownership and operation, which is their idea of Utopia. What a rude awakening the brotherhoods are going to have some day!"

Government Ownership?—No!

Fortune, in its July issue, published its Quarterly Survey: XIII. One of the questions asked in the survey was, "Do you think government should take over the railroads?" "Yes," replied 25.7 per cent, a slightly lower percentage than in a similar questionnaire published in January, 1936, eighteen months ago. "No," said 52.8 per cent, as compared to 51.8 per cent in January, 1936. The percentage which "don't know" was the same in both questionnaires, 21.5 per cent. "Now, as before," says Fortune, "sentiment against government ownership runs through every economic level, with decisive majorities of those having opinions, and by geography there is only one part of the country that favors it—the Pacific Coast, which also was found to be the most in favor of greater power for federal government, as against state government."

Congress and the Railroads

Congress having failed to enact any constructive legislation for the relief of the railroads, the Administration apparently is now resting its hopes on a general business revival that it anticipates will result from its pump priming activities during the summer and fall months. If the railroads fail to find some measure of relief in this way, there is some talk of the possibility of calling a special session of Congress in the fall. Naturally, in the face of a hotly contested election, such a move would not be welcomed by most of the legislators. It might insure quick action, however, since the members would be keen to get back home as quickly as possible. Hurried decisions under such circumstances might make the situation worse, rather than better. The House Committee on Interstate and Foreign Commerce has appointed a subcommittee to study the desirability of legislation to reorganize transportation and co-ordinate regulation as between competitive agencies. The Senate Committee on Interstate Commerce has not appointed such a committee, but Chairman Wheeler's subcommittee, of which much was expected during the early part of this year, may be inspired to turn its attention to a legislative program which will really be helpful in improving the railway situation. On the basis of its past accomplishments, however, this may be expecting entirely too much.

We Wonder!

We are all sympathetic with the desire to raise still higher the living standards in this country, even though they are now far beyond those of any other country in the world. But you can't divide what you haven't got, and in the effort to spread the national income more evenly, something somewhere has gone seriously wrong, and there is now far less income to divide than there should be. We have ample national resources and the plant and personnel to make and distribute the products that are in demand to meet the necessities, comfort and convenience of our people, but these facilities are either lying idle or are being utilized to only a small part of their capacity. According to the Department of Commerce, the estimated national income of the United States in 1937 was very nearly 70 billion dollars; in 1929 it was 80¾ billion dollars. In view of what has transpired following previous depressions, it should have increased to at least 90 billion dollars in 1938. Even the most optimistic predictions, however, do not place it above 60 billions—a shortage of 30 billions, or enough to pay off a substantial part of the national debt. Samuel O. Dunn, editor of the Railway Age, in an address at Owosso, Mich., on May 25, pointed out that "you cannot have a large national income unless you have constantly going on a large investment of capital. It is capital that employs labor, and if you keep capital from working, it will not employ labor." Economists seem pretty well agreed that the many attacks which have been made on capital are largely responsible for the present state of affairs. Looks like cutting off the nose to spite the face!

Spirit of the Dark Ages

Railroad labor leaders, flushed with victory in bluffing Congress to a standstill, take credit for blocking the passage of the bill to liberalize the requirements of the Reconstruction Finance Corporation in lending money to the railroads, so that under the present abnormal economic conditions they might avoid receiverships. These leaders not only deliberately refused to go along with the railroads, unless the latter withdrew from their effort to reduce railway wages, but brought pressure upon Congress and the Administration to prevent the law being enacted; this in spite of the fact that under the Railroad Labor Act, wage reductions can only be made under slow and orderly processes, in which the workers are amply protected at every turn. As a result, with rates maintained at too low a level by the Interstate Commerce Commission and with no constructive or remedial legislation enacted at the last session of Congress, and little pick-up in general business, the railroads must continue to struggle along and neglect activities which would have called men back from their furloughs, or would have added to the small working time and earnings of others. Meanwhile, the men at the top of the seniority lists in the operating services march on undismayed by the plight of their less fortunate fellows, refusing to give up even a little of their advantage; yes, more than this, they unblushingly exerted all the power they had to embarrass the railroads and force them to greater extremities, even though it meant pushing their less fortunate fellows back down into the pit of unemployment. This statement is made in spite of the fact that the railroad labor leader spokesman insists that opposition to the bill was withdrawn near the close of the session. It was too late then to do good.

(*Turn to next left-hand page*)

This CHILLED CAR WHEEL
is one of more than
16,000,000
in use on North American Railroads
Chilled Wheels possess qualities not found in wheels made from other materials. Their surface hardness makes them long lived. The heaviest loads have no effect on rotundity because the metal will not flow. Increased Brake Shoe Life and minimum abrasion of rails lead to important maintenance economies. Reduced train resistance, due to lessened resistance between flange and rail, effects operating economies. Factor of Safety of Chilled Wheels is not exceeded by any other material. Quality and uniformity are maintained by a Centralized Inspection System which controls manufacturing operations from cupola to final inspection.
ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
445 N. Sacramento Blvd., Chicago, Illinois
230 Park Avenue, New York, N. Y.
AMCCW

NEWS

Purchases and Stores Committees Meet

In lieu of its convention, the Purchases and Stores Division, A. A. R., will hold a meeting of its General and Advisory committees at the Palmer House, Chicago, on Wednesday, July 13, to consider the reports prepared by its committees, and to pass upon their release.

S. A. L. Locomotive Runs 20,049 Miles in a Month

Locomotive No. 249 of the Seaboard Air Line ran 20,049 miles during January, according to E. H. Roy, superintendent of motive power. During the month, the locomotive, one of the road's latest "Mountain" types, was at work pulling the Orange Blossom Special, limited train between New York and Florida, daily between Hermitage, Va., and Baldwin, Fla.

Stoker Order Postponed

The Interstate Commerce Commission has postponed from July 1 to October 1 the effective date of its order in the automatic stoker case. This action was taken after attorneys for 179 railroads filed suits in the federal district court at Cleveland, Ohio, on June 14, seeking to restrain an Interstate Commerce Commission order requiring installation of automatic stokers on all coal-burning locomotives. The order, issued last December, required that 20 per cent of the locomotives be equipped with stokers by July 1 and another 20 per cent each year thereafter.

B. & O. Places Diesels on N. Y.-Capital Runs

The Royal Blue and the Columbian, streamlined trains of the Baltimore & Ohio, making round-trips daily between New York and Washington, D. C., are now operated by 3,600 hp. Diesel-electric locomotives. The extension of Diesel power to regular service on these trains was effected with the recent delivery to the B & O. of two new locomotives from the La-Grange, Ill., plant of Electro-Motive Corporation. They are alike in every way to the four predecessors that were assigned some months ago to the Capitol Limited and the National Limited.

New German Diesel-Electric Embodies New Features

The German State Railways is experimenting with a new type of Diesel-electric train which rests upon springs fitted directly to the floor of the body frame and in which the Diesel engines and generators are installed in the protruding part of the front car, where, it is claimed, they are subject to a minimum of shocks. The train, which consists of three cars having a total length of 70 meters (229.6 ft.) has a dead weight of 113 metric tons, develops an average speed of 160 km.p.h. (99 m.p.h.) and can accommodate 100 passengers, according to consular reports. It differs from the conventional type of Diesel-electric train in that its two 600-hp. Diesel engines and their respective generators are carried in the forward part of the leading car and do not rest directly on the main trucks, as is customary in European practice. Furthermore the train rests on its main springs at the floor of the body frame instead of through the trucks. These springs are of a specially-designed transverse type and aid resistance against lateral movements in passage around curves.

B. & O. "Covered Wagon" Top Box Cars

The Baltimore & Ohio has recently assigned 100 new type covered wagon-top box cars to its two fast merchandise trains No. 117 and 118, running overnight between New York and Pittsburgh, Pa. The new cars replace conventional type express cars formerly used in this service, releasing them for use elsewhere on the road. The chief reason for installation of the new cars, officers state, is the advantage of greater shipping space which this type of box car affords, since the loading area of each exceeds that of the conventional type by 919 cu. ft.

Equipment Depreciation Rates

Equipment depreciation rates for 14 railroads, including the Missouri Pacific, the Chicago & Eastern Illinois and the Wheeling & Lake Erie, are prescribed by the Interstate Commerce Commission in a new series of sub-orders and modifications of previous sub-orders in No. 15100, Depreciation Charges of Steam Railroad Companies. The composite percentages, which are not prescribed rates, range from 3.35 per cent for the Tonopah & Goldfield to 15.82 per cent for the Okolona, Houston & Calhoun City.

The Missouri Pacific's composite percentage of 3.71 per cent is derived from the following prescribed rates: Steam locomotives, 3.47 per cent; other locomotives, 3.93 per cent; freight-train cars, 3.97 per cent; passenger-train cars, 3 per cent; floating equipment (leased), 2.91 per cent; work equipment, 3.65 per cent; work equipment (leased), 4.7 per cent; miscellaneous equipment, 10.98 per cent. The composite percentage for the C. & E. I. is 3.6 per cent, derived from prescribed rates as follows: Steam locomotives, 3.5 per cent; other locomotives, 4.85 per cent; freight-train cars, 3.54 per cent; passenger-train cars, 3.66 per cent; floating equipment, 4.78 per cent; work equipment, 5.27 per cent; miscellaneous equipment, 25 per cent. The W. & L. E. composite percentage is 3.71 per cent with prescribed rates as follows: Steam locomotives, 3.69 per cent; freight-train cars, 3.72 per cent; passenger-train cars, 4.39 per cent; work equipment, 3.47 per cent; miscellaneous equipment, 15.65 per cent.

N. Y. R. R. Club Outing

Some 850 railroad and supply men attended the annual outing of the New York Railroad Club on June 9 at the Westchester Country Club, Rye, N. Y. Golf and other games and diversions consumed the major part of the day while a banquet constituted the evening program. There were 382 entries in the various golf tournaments and 479 rounds of golf were played. The H. H. Vreeland trophy, for the first time since the inauguration of golf tournaments by the club in 1920, was captured by a team of railroad men who this time wrested it from railroad supply representatives. The winning team, which played a score of 322, included Harry Nunn, West Springfield, Mass.; R. Wainright, New York; F. W. Felde, Jackson, Mich.; W. J. Sasso, Cleveland, Ohio, all

(*Continued on next left-hand page*)

New Equipment Orders and Inquiries Announced Since the Closing of the June Issue

Locomotive Orders

Company	No. of Locos.	Type of Loco.	Builder
Seaboard Air Line	9	1,800-hp. Diesel-elec.	Electro-Motive Corp.

Locomotive Inquiries

Malahat Logging Co.	1	Oil-burning loco.	.....

Freight-Car Orders

Road	No. of Cars	Type of Car	Builder
Bethlehem Mines Corp.	7	Air-dump	Austin-Western Road Machinery Co.
Lehigh & New England	50	70-ton hopper-bottom[1]	American Car and Foundry Co.
U. S. Navy Dept., Bureau of Supplies and Accounts	3	Flat	Haffner-Thrall Car Co.
	1	Box	American Car and Foundry Co.
	2	Tank	American Car and Foundry Co.
U. S. Sugar Corp.	20	30-ton cane	Magor Car Corp.

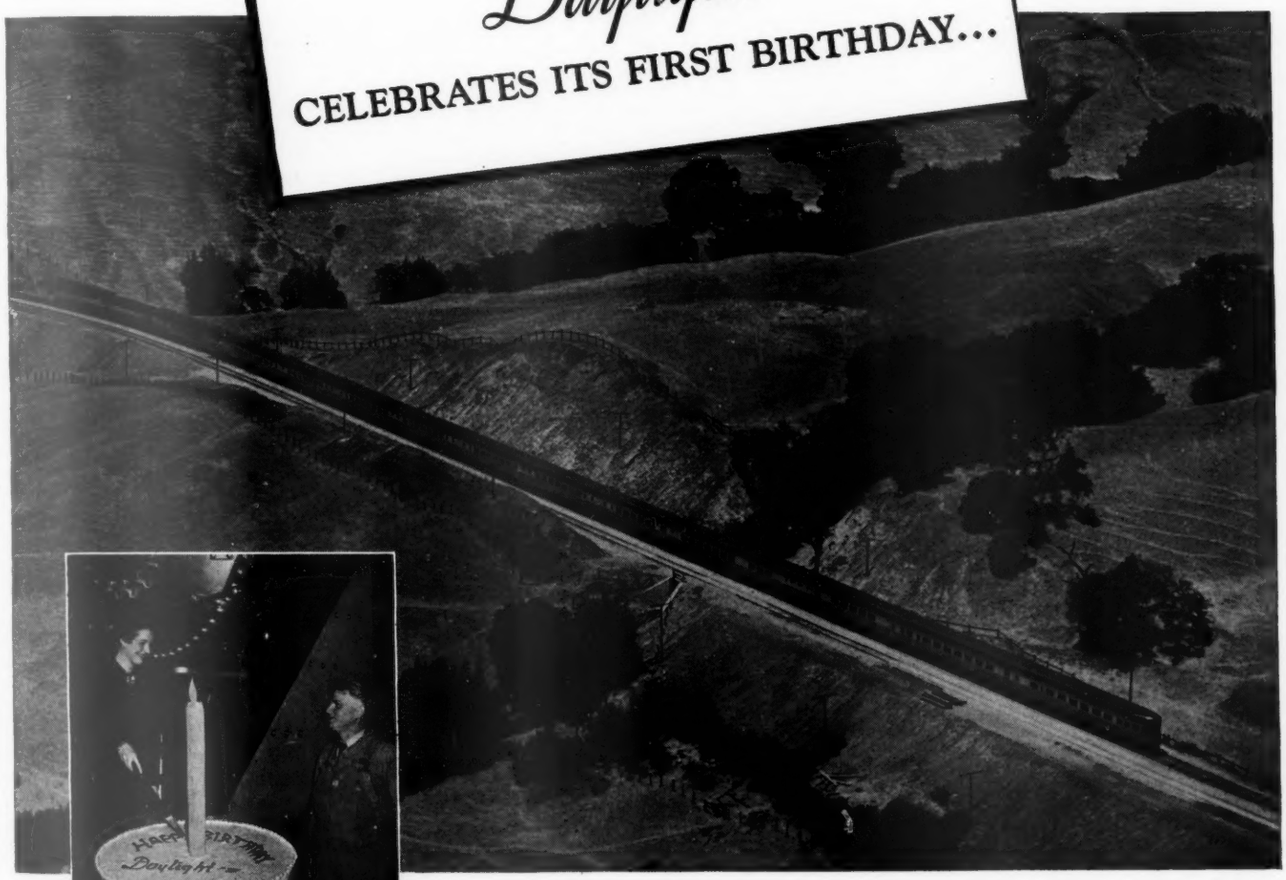
Passenger-Car Orders

Road	No. of Cars	Type of Car	Builder
Canadian National	5	Mail and express	Canadian Car and Foundry Co.

[1] These are to be special-body, hatchway-roof, hopper-bottom steel cars for bulk-cement loading. Inquiry for this equipment was reported in the February issue of the *Railway Mechanical Engineer*.

THE *Daylight*

CELEBRATES ITS FIRST BIRTHDAY...



...and claims a record!

On March 21st, 1938 the "Daylight", of the Southern Pacific Railway Company, celebrated its first birthday. On the same day it claimed the record of "The world's most heavily patronized one-section, long-distance daily train."

During this first year of operation, the north and south bound trains between Los Angeles and San Francisco carried a total of 253,573 passengers, an average of 695 passengers each day.

This record clearly shows the increasing public demand for comfortable, high-speed streamlined trains; trains that, like the "Daylight", are powered by steam locomotives capable of covering their route quickly, comfortably and economically.

LIMA LOCOMOTIVE WORKS — LIMA LOCOMOTIVE WORKS INCORPORATED — INCORPORATED, LIMA, OHIO

of whom are connected with the New York Central system. The winner of the Daniel M. Brady cup was E. D. Searle of the American Arch Company, who played a gross score of 78 and net of 72.

C. A. Gill, general manager of the Reading and president of the club, presided at the banquet.

R. R. Retirement Board Issues Regulations

THE Railroad Retirement Board has prescribed "Regulations Under the Railroad Retirement Act of 1937," effective as of June 1, 1938, which supersede all previous regulations. The following matters are governed by the regulations: Definitions, employers, employees, employment relation, employee representative, eligibility for an annuity, execution and filing of an application, annuity beginning date, relinquishment of rights, definition and creditability of service, definition and creditability of compensation, computation of an annuity, elections of joint and survivor annuities, payments at death, payments of benefits of $500 or less, pensions, reports, information, hearings and witnesses, recovery of erroneous payments, appeals within the Board, and applicability of 1935 or 1937 Act.

Machinists' Union 50 Years Old

THE International Association of Machinists, often called "The War Dogs of the Labor Movement," reaches its 50th year of existence this year, according to a short history of the union by A. O. Wharton, president of the union, which appears in the current Labor Information Bulletin of the United States Department of Labor. The first meeting of the machinists was held on May 5, 1888, by a group of ten men in the Atlanta (Ga.) shops of the Wilmington, Columbia & Augusta under the name of the United Machinists & Mechanical Engineers of America. This group later became Lodge No. 1 of the International Association of Machinists.

The article traces briefly the development and growth of the union, its "liberalization" to meet the changed conditions brought about by the use of semi-automatic and automatic machinery, its provisions for apprentices and its strike record. Mr. Wharton also devotes a paragraph to the negotiation in 1892 of the first agreement ever participated in between a railroad and its shop craft employees, which was signed by the machinists, boiler-makers, and blacksmiths with the Union Pacific and the Atchison, Topeka & Santa Fe. In 1919 the machinists also joined the Railway Employees department of the American Federation of Labor in agreements with the United States Railroad Administration. Present membership of the union is estimated to be in excess of 200,000.

Arch Bar Truck Date Extended

IN a circular sent to all car owners under date of June 25, 1938, J. M. Symes, vice-president, Association of American Railroads, Operations and Maintenance department, announces that the effective date of the interchange rule prohibiting the interchange of cars equipped with arch bar trucks has been extended six months. Interchange Rule 3, Sec. (t), Par. (4), in the 1938 code, provides that effective July 1, 1938, cars with arch bar trucks will not be accepted from car owners. The Board of Directors, in considering this rule, has extended the effective date until January 1, 1939.

According to a recent statement by J. J. Pelley, president of the A. A. R., only about two per cent of the total railroad-owned cars, which are regarded as suitable for service or worthy of repairs, are now equipped with arch-bar trucks.

Diesel Train Anniversaries

ANNIVERSARIES of Diesel train performance were celebrated by the Chicago & North Western-Union Pacific and the Chicago, Burlington & Quincy on June 20 and 21. The North Western observed the second anniversary of the Streamliner City of Denver, which operates between Chicago & Denver. The train, on entering the Chicago terminal, had completed 1,530,000 miles and up to the end of April had carried 190,000 passengers.

At 6:07 p. m. on June 21 the eight Zephyrs of the Chicago, Burlington & Quincy completed the five millionth Zephyr mile, which was recorded on a giant odometer, which had been constructed in the Union Station, at Chicago, and which gave the figures actually moving into place for the five millionth mile. At 6:07 p. m. one of the two Denver Zephyrs was near Aurora, Ill., the other near Ft. Morgan, Col. One twin Zephyr was near Savanna, Ill., and the other near East Winona, Wis. The Pioneer Zephyr was leaving Council Bluffs, Iowa, the Mark Twain Zephyr was approaching Hannibal, Mo., the Ozark State Zephyr was near Marshall, Mo., and the Sam Houston Zephyr was near Corsicana, Tex. The mileage each train contributed to the total of 5,000,000 miles is as follows: The two Chicago-Twin Cities trains, 2,007,743 miles; the two Chicago-Denver trains, 1,512,549 miles; the Lincoln-Omaha-Kansas City train, 547,701 miles; the Houston-Dallas-Fort Worth train, 353,040 miles; the St. Louis-Kansas City train, 308,673 miles; and the St. Louis-Burlington train, 270,294 miles. The Zephyr fleet has carried a total of 1,260,000 passengers.

La Follette Wants Carriers to Modernize—Under Pressure

CHARGES that railroad equipment is worn out and obsolete; that complete replacement of rolling stock ought to be made a national aim,—carried through by government pressure, if necessary, appear in a booklet published by the National Progressives of America, the so-called "third political party" recently organized by Governor "Phil" La Follette of Wisconsin. The booklet, which outlines the aims of the party makes reference to railroad modernization as an outstanding example of "spending for prosperity." It is pointed out that railroad equipment is worn out and obsolete; and that the carriers "haul from one end of the county to the other quantities of dead, unnecessary weight." It is then recommended that the carriers install "new, light metals, new engines, new road beds which would cut the cost of transportation and give the American people tremendously improved service."

"A government" says the bulletin "that saw the problem, and had the courage to act, could cut through the red tape in a few months. First, require an engineering survey (not a bankers', but an engineers') to determine what is needed to give our country the most efficient transportation system in the world. Next, order that it be done. Then, a judicial proceeding permitting the new capital financing it to step in ahead of the old bonds. Thus we would put three or four billion dollars of idle capital to work, create millions of new jobs, and when done we would have something real to show for our money. This would push the old bonds back, and let new money go to work. It would not destroy the old bonds—they would have just what they had before. But in place of idle men and idle money we would have working money and working men."

Five More Fusion-Welded Tank Cars

THE Interstate Commerce Commission, by Commissioner McManamy, has authorized the General American Transportation Corporation to construct five tank cars fabricated by fusion-welding for experimental service in the transportation of butyraldehyde. The report—a supplemental one in No. 3666, In the Matter of Regulations for the Transportation of Explosives and Other Dangerous Articles—states that the application, which was approved by the Tank Car Committee and Bureau of Explosives Association of American Railroads, was the first for authority to employ fusion-welded tank cars for butyraldehyde; although previous decisions have granted applications for authority to built a total of 522 such cars for experimental service in the transportation of "dangerous articles other than explosives."

Suggests Government Buy 300,000 Cars to Lease to Roads

SENATOR Shipstead of Minnesota, on June 23, submitted to Public Works Administrator Ickes a plan whereby the government would place orders immediately for at least 300,000 freight cars and sell them to the railroads on an installment payment plan. Mr. Shipstead estimated that the cost of the new cars would be $700,000,000 and he suggests that the government turn them over to the carriers under a lease-sale agreement extending over a period of some 15 to 20 years, carrying interest at the rate of 2½ per cent on the deferred balance. Mr. Shipstead described the proposal as a "project to sell for scrap the 300,000 obsolete freight cars that are now nothing but a source of additional out-of-pocket cost to the roads and replace them with new and modern equipment."

On June 24 the Senator talked with the President regarding his proposal and reported that Mr. Roosevelt was favorably

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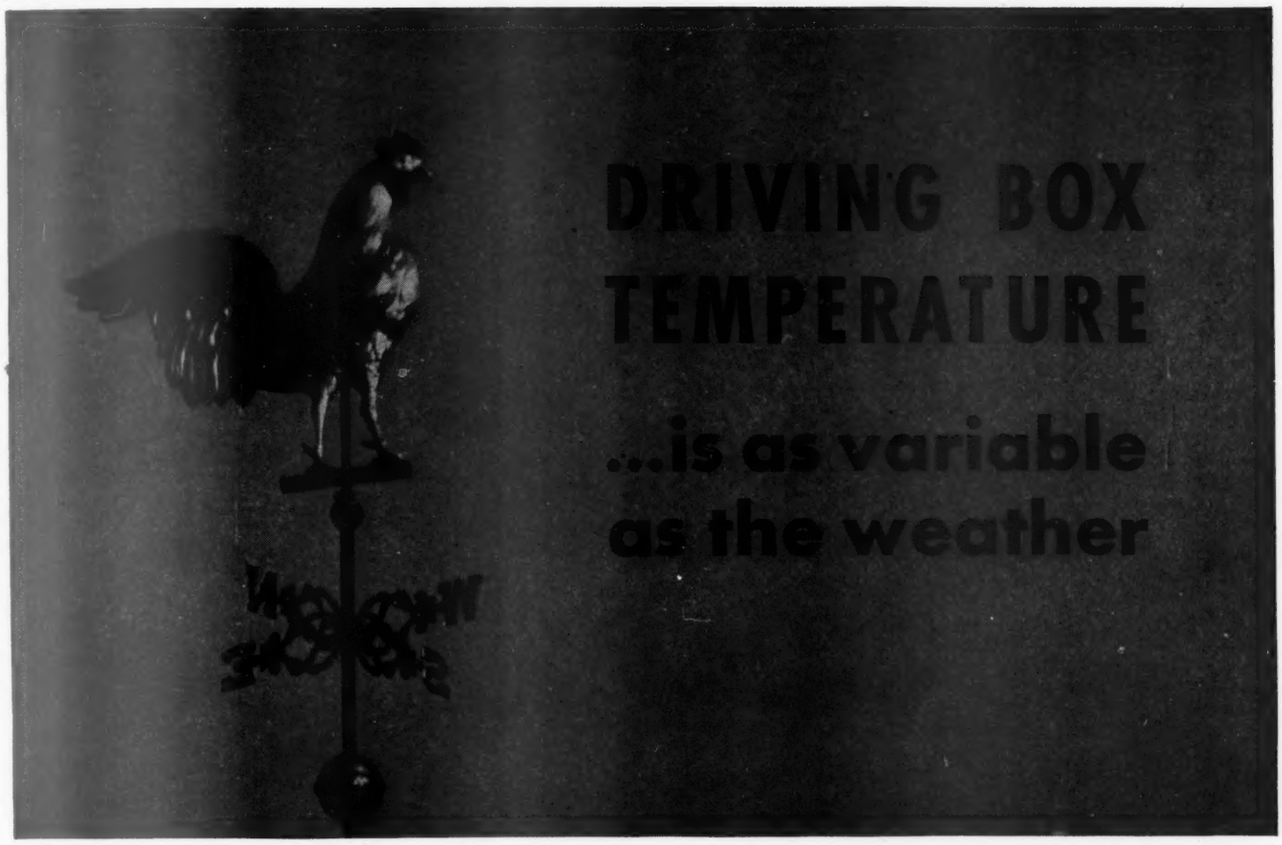
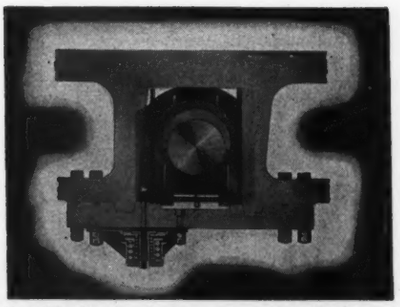


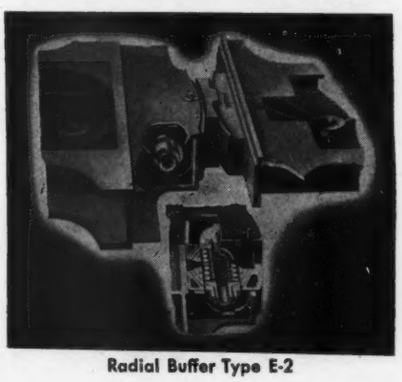
Due to friction, the temperature of the ordinary driving box varies as much as 250° in short periods of time. A wedge set when the engine is cool will be either too loose or too tight when the engine is running . . . But you *can* have your wedges correctly adjusted, even when running at top-speed.

The *Franklin Automatic Compensator and Snubber* adjusts the wedges automatically, compensating for expansion and contraction and maintaining accurate driving box fit at all times. It also compensates for wear and provides a spring-held snubbing resistance that cushions unusual shocks and maintains correct alignment of moving parts.

Its twin, the Type E-2 Radial Buffer, with its predetermined spring-held frictional resistance to slack and oscillation, maintains a constant engine-tender relationship. Together they make an easier riding locomotive and reduce track, car and locomotive maintenance.



Franklin Automatic Compensator and Snubber



Radial Buffer Type E-2

The close tolerances essential to efficient Booster operation call for genuine repair parts made by Franklin.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

impressed with it. At the same time the legal department of the Public Works Administration was studying the plan to see whether or not that agency could provide the financing for the 300,000 cars contemplated in the scheme, and the PWA was conferring with the Reconstruction Finance Corporation to see whether or not that agency would be interested in providing the money necessary for the construction.

The Senator said that he had received a large amount of corespondence regarding his plan and that none of the letters contained any unfavorable comment. President Pelley of the Association of American Railroads told reporters that he had received a copy of the plan and that the A. A. R. railroad presidents who were in Washington during the week ended June 25 attending a monthly directors' meeting, were favorably impressed with the idea.

The Senator's plan is based on the experience of the Minneapolis & St. Louis. According to Senator Shipstead, when L. C. Sprague, one of the trustees, took over that road in 1935, it was undermaintained. The road had 4,800 obsolete cars that had not moved for 15 years. One of the first things that Mr. Sprague did, according to the Senator's statement, was to scrap the old cars, and with some of the money received by this method, he bought 75 new freight cars outright. He also purchased 402 new freight cars on a "rental-lease" plan, similar to the one now proposed. These changes enabled the road to make substantial savings on the $1 a day charged it for the use of "foreign cars." In addition to this, continued Senator Shipstead, Mr. Sprague replaced the road's wooden passenger cars with steel underframe cars and scrapped 50 old light locomotives and equipped the heavier locomotives with the most modern devices.

Pennsylvania Authorizes $8,315,000 Equipment Purchases

THE Pennsylvania has authorized the construction of 1,000 gondola cars, 8 special type cars for freight service and 20 electric passenger locomotives, at a cost of about $8,315,000. An announcement of M. W. Clement, president of the railroad, says that this work is being undertaken to provide additional work for railroad employees at the Altoona, Pa., shops, to promote greater efficiency in transportation service to shippers and passengers and to improve the economical operation of the railroad. The gondola cars will be 52½ ft. long and of 70 tons' capacity, while the 8 special type freight cars will include 6 well cars of 120 tons' capacity and 2 flat cars of 200 tons' capacity. The 20 locomotives will be of the Pennsylvania's streamlined GG-1 type, especially designed for high-speed electric passenger service between New York, Philadelphia, Pa., Baltimore, Md., Washington, D. C., and Harrisburg, Pa. All of the freight cars and the chassis of the locomotives will be built in the railroad's Altoona shops and this work will provide more than 1,000,000 man-hours of employment in these shops as well as additional employment in the plants of the manufacturing companies where the electrical parts will be made.

Railroad Labor's Unemployment Bill

RAILWAY labor's unemployment insurance bill went through Congress during the last days of its session, and was later signed by the President, despite the Treasury Department's action in transmitting to House and Senate committees the advice it had received from the Bureau of the Budget that "the proposed legislation would not be in accord with the program of the President."

The bill contains 17 sections, and removes from the coverage of the unemployment insurance acts of the states and from Title IX of the Social Security Act the employees and employers covered by the Railroad Retirement Act of 1937 and the Carriers' Taxing Act of 1937. Thus in addition to railroad employees, eligible beneficiaries include their union representatives, although the latter are required to contribute three per cent of their monthly salaries up to $300—the same basis upon which railroad payrolls are taxed. Railroad employees will make no contribution. The Railroad Retirement Board will administer the unemployment insurance act.

Qualifications for and the amount of benefits are dependent upon the compensation earned by the employee during his "base year" which is the last completed calender year preceding a "benefit year." Benefits, computed on a daily basis, range from $1.75 to $3 per day in accordance with the amount earned during the base year. The maximum an individual can receive during a benefit year is 80 times his daily benefit rate, the range thus being from $140 to $240. The benefits provided are, for most employees and as a whole, more liberal than the benefits provided under existing state laws.

Special provisions are made for part-time workers and workers whose normal work shift extends over two days; in the case of the former group, only a day in which a part-time worker is normally employed may be counted as a day of unemployment, and in the case of the latter group, a 24-hour period is substituted for the calender day in counting days of unemployment. There are two conditions which an employee must meet to qualify for benefits—he must have earned $150 during his base year and he must have served a waiting period of unemployment before unemployment becomes compensable. Among the disqualifying conditions are those covering train and engine service employees who run up their monthly mileages in a comparatively few days. These are disqualified for benefits with respect to any half-month during which they perform 25 per cent of the maximum employment allowable to them for any calendar month, and with respect to any full month in which they perform at least 50 per cent of the maximum allowable. Strikers are disqualified if they are unemployed as a result of a strike "commenced in violation of the Railway Labor Act or in violation of the established rules and practices" of labor organizations, unless they "are not participating in or financing the strike and do not belong to a class of workers any of whom are participating in or financing or directly interested in the dispute." Payment of regular union dues "is not to be considered financing a strike within the meaning of this qualification."

Supply Trade Notes

WALTER K. Dow has been elected vice-president of the Alexander Milburn Co., Baltimore, Md.

◆

F. G. WOLF has been appointed manager of the Railroad Division of the Kenite Laboratory, Inc., 83 Murray street, New York.

◆

THE INTERNATIONAL NICKEL COMPANY, INC., New York, has established a new field office in the Grant building, Pittsburgh, Pa., under the direction of H. V. Beasley, who for the past three years has been attached to the New York office.

F. J. DEMAREST has been elected president, and H. G. Russell, treasurer and general manager, of Greene, Tweed & Co., New York.

◆

H. B. SPACKMAN, formerly in the steel products division of the U. S. Gypsum Company, has been elected vice-president in charge of sales and advertising of Lyons Metal Products, Inc., Aurora, Ill.

◆

M. FLANAGAN has been appointed southeastern representative of the Superior Hand Brake Company, Chicago, with headquarters at Richmond, Va.

N. B. ROBBINS has been appointed representative of the Hunt-Spiller Manufacturing Corporation, Boston, Mass., to fill the vacancy caused by the death of R. R. Wells.

◆

DAVID T. MARVEL has been appointed manager of tube sales for the Timken Roller Bearing Company, Canton, Ohio. Mr. Marvel's headquarters are at the main office in Canton.

◆

W. R. SPILLER has become affiliated with the Timken-Detroit Axle Company, De-

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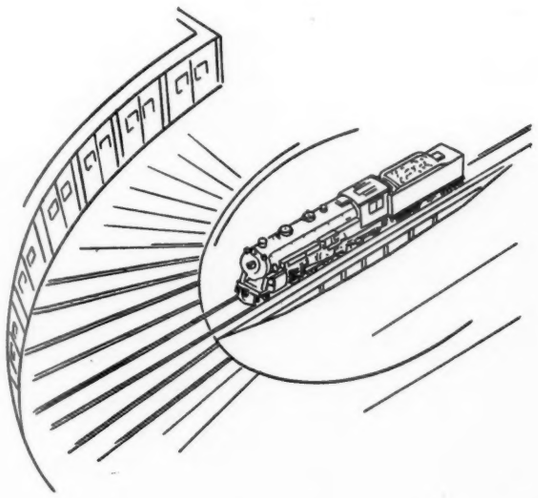
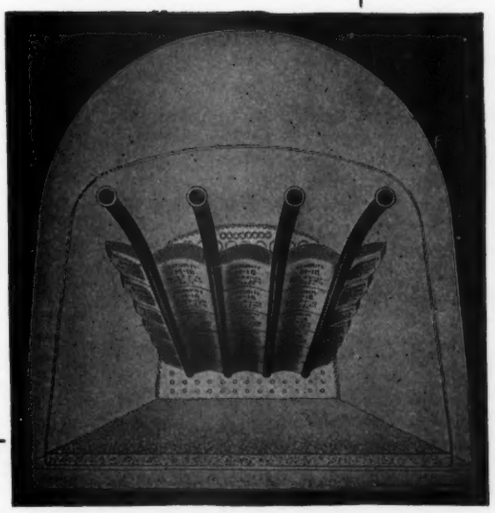
BE SURE
No Arch Brick Is Missing





There's More to SECURITY ARCHES *Than Just Brick*

In these days of rigid economy, don't draw the line too fine and let a locomotive leave the roundhouse with an imperfect Arch due to lack of supplies.

A single missing Arch Brick has a mighty serious effect on steaming and on the efficiency of the locomotive.

Today, a dollar's worth of fuel means more than ever before. To spend it effectively, every Locomotive Arch should be maintained in perfect condition.

Be sure your stocks on hand are ample to provide fully for all locomotive requirements, so that locomotive efficiency will not suffer.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED
60 EAST 42nd STREET, NEW YORK, N. Y.
Locomotive Combustion Specialists

troit, Mich., as sales engineer. Previous to his new appointment, Mr. Spiller was chief engineer of the White Motor Company, Cleveland, Ohio.

◆

RAYMOND M. DENNIS, superintendent of flanging of the Lukens Steel Company, Coatesville, Pa., has been appointed general manager of the flanging department, in charge of estimating, sales and production on flanging work.

◆

THE DEVILBISS COMPANY, Toledo, Ohio, has transferred its manufacturing operations on rubber and synthetic rubber hose for spray painting, compressed air lines, gasoline pumps and other industrial uses, to its new hose plant at LaGrange and Gradolph streets, Toledo.

◆

THE SUPERGEAR DRIVE CORP., 105 West Adams street, Chicago, has been organized by W. A. McCallum and Ernest Lunn, and has acquired the exclusive manufacturing and sales rights to Type "B" Gear Drive and parts for the operation of train lighting and air-conditioning systems.

◆

GEORGE R. BOYCE of A. M. Castle & Co., Chicago, died at the Passavant hospital on June 14, after an illness of almost a year as a result of an automobile accident. Mr. Boyce became associated with A. M. Castle & Co., on January 1, 1912, and served as director and vice-president in charge of railroad sales for many years.

◆

EDWIN L. LARON has been appointed assistant sales manager of the Machine Tool Division of the Van Norman Machine Tool Company, Springfield, Mass. Mr. Larson was formerly chief engineer of the Baush Machine Tool Company and for the past two and one-half years has been in the engineering department of the Van Norman Company.

◆

GEORGE H. BUCHER, executive vice-president of the Westinghouse Electric & Manufacturing Company, has been elected president to succeed Frank A. Merrick, who becomes vice-chairman of the board, both with headquarters at Pittsburgh, Pa. Paul J. Myler, president of the Canadian Westinghouse Company, has been elected a director of the Westinghouse Electric & Manufacturing Company.

◆

THE EDWARD O'MALLEY VALVE CO., Blue Island, Ill., has purchased the Central Valve Mfg. Co., successor to the O'Malley-Beare Valve Company, and moved its offices to the Central's plant at 231 East Ninety-fifth street Chicago. Officers of the new company are: president, Edward O'Malley, Sr.; vice-president, Edward O'Malley, Jr.; secretary, J. G. McNeil; and general manager, S. C. Boston.

◆

W. J. MAYER has joined the staff of the A. M. Byers Company, Pittsburgh, Pa., as a sales engineer. He will work out of the company's Philadelphia division office, and his territory will include Baltimore, Md., and the south. He will be associated with E. L. MacWhorter, division manager at Philadelphia. Mr. Mayer previously served as commercial research engineer for the Reading Iron Company.

◆

AT A RECENT reorganization of The Dayton Manufacturing Company, Dayton, Ohio, the following officers were elected: H. D. Hendrick, president and general manager; H. E. Knoll and E. W. Mink, vice-presidents, all located at Dayton. T. R. Sullivan, eastern sales manager, New York City, has also been elected a vice-president, and a new office has been opened in the Transportation building, Chicago, with Floyde Lego in charge.

◆

THE ARMSTRONG BROS. TOOL COMPANY, Chicago; the Apex Tool & Cutter Company, Shelton, Conn.; the Pratt & Whitney Company, Hartford, Conn.; the Davis Boring Tool Division of the Larkin Packer Company, St. Louis, Mo.; the Wendt-Sonis Drill Works, Hannibal, Mo.; the Cole Carbide Industries, Detroit, Mich., and the Genesee Tool Co., Inc., Fenton, Mich., have signed dealer contracts with the Vascoloy-Ramet Corporation, North Chicago, Ill.

◆

MANNING, MAXWELL & MOORE, INC., Bridgeport, Conn., has appointed nine new field salesmen in territories as follows: Paul Hayden, Charlotte, N. C.; W. H. Kissam, Jacksonville, Fla.; R. F. Heath, New Orleans, La.; K. W. Johansson, Minneapolis, Minn.; W. S. Adams, Columbus, Ohio; V. W. Farris, New York; H. H. Jones, Philadelphia, Pa.; H. B. Stallings, Chicago, and C. W. Velie, Tulsa, Okla. The new district sales managers were also appointed: R. W. Neel, who has represented the company for a number of years is now in charge of the newly created southeastern district, with headquarters at Atlanta, Ga., and Malcolm Black, has been appointed manager of the southwestern district, with headquarters at Tulsa.

◆

THE AMERICAN BRAKE SHOE & FOUNDRY CO., New York, has organized the Brake Shoe & Castings Division with its own group of officers, as follows: M. N. Trainer, president; F. P. Biggs, E. V. Smith, W. H. Winters and C. P. Wright, vice-presidents; J. T. Talbot, assistant to president. This division will engineer, produce and market all products formerly handled as The American Brake Shoe & Foundry Co. William B. Given, Jr., is president of The American Brake Shoe & Foundry Co., which is now composed of the following divisions: Brake Shoe & Castings, American Brakeblok, American Forge, American Manganese Steel, Ramapo Ajax, Southern Wheel.

F. P. Biggs was born in 1891 and has been with The American Brake Shoe & Foundry Co. since October, 1916, except during the World War, when he served as an army pilot in the United States Air Corps. In 1921 he was transferred to the western sales department of The American Brake Shoe & Foundry Co., as a salesman, and since January, 1934, served as assistant vice-president in charge of western sales. Edward Barrett Smith began his business career at the time of the formation of The American Brake Shoe & Foundry Co. For many years, he specialized in the sale of brake shoes and castings and miscellaneous products of the company. Since 1928, he served as assistant vice-president. J. T. Talbot was born in 1896, and was employed by the Baltimore & Ohio from 1913 to 1920 as special apprentice, locomotive inspector and gang foreman. He served two years overseas in the 19th Railway Engineers. In June, 1920, he entered the employ of The American Brake Shoe & Foundry Co. as sales representative, serving in that capacity until his recent promotion.

◆

THE VASCOLOY-RAMET CORPORATION, North Chicago, Ill., has made the following additions to its sales engineering staff: George M. Mencke, sales manager; James A. Fraser, assistant sales manager; A. M. Kebe, district manager of the Cleveland, Ohio, territory; C. M. Grannis, district manager of the Detroit, Mich., territory; C. W. Blade, district sales manager of the New England territory; Walter J. Dennis, die sales engineer in the western territory, with headquarters at Chicago; M. W. Dennis, Jr., die sales engineer in the eastern territory, with headquarters at Pittsburgh, Pa., and S. A. Miniea, sales engineer in the Chicago territory. Mr. Mencke was formerly with Thomas Prosser & Sons and later with the Carboloy Company, Messrs. Fraser, Kebe, Grannis, Blade and M. W. Dennis were formerly with the Vanadium-Alloys Steel Company. Walter J. Dennis was formerly with the Illinois Tool Works.

Obituary

CHARLES F. MICHAEL, founder and president of the Ohio Locomotive Crane Company, Bucyrus, Ohio, died on May 4.

◆

WILLIAM F. KINGSTON, who resigned as vice-president of the American Car & Foundry Co., in 1925 and who since has been president of the Lake Erie Tobacco Company, Thomas, Ont., died in St. Louis, Mo., on June 6, of complications, while on a business trip.

◆

J. L. RANDOLPH, who retired as vice-president of the Franklin Railway Supply Company, with headquarters at Chicago, in 1934, died at St. Anthony's Hospital, Rockford, Ill., on June 14 after an extended illness. He retired after 25 years of service with the company.

◆

JOHN D. MCCLINTOCK, manager of the injector division of William Sellers & Co., Inc., Philadelphia, Pa., died on June 4, following a six weeks' illness. Mr. McClintock became affiliated with William Sellers & Co., Inc., on April 11, 1881. He was appointed manager of the injector division in January, 1929.

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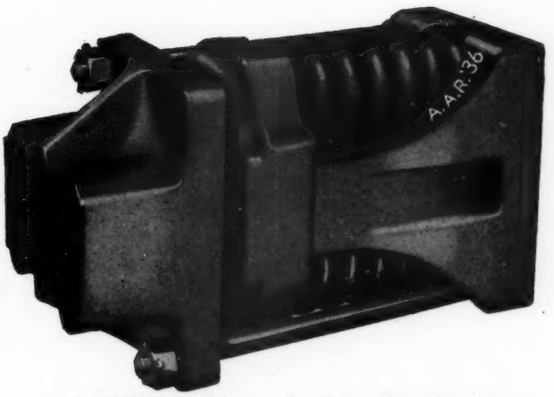
Meet All Requirements

NATIONAL FRICTION DRAFT GEARS

Approved By Association of American Railroads

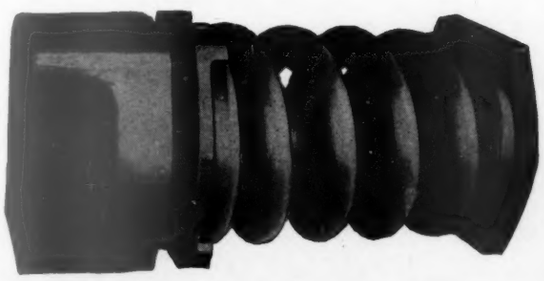


NATIONAL M-17-A DRAFT GEAR
22⅜" long

PROTECTION of cars and lading from destructive shocks incident to modern high speed service is accomplished ideally by National Friction Draft Gears.

They possess all necessary requisites — capacity — sturdiness — endurance — smoothness and uniformity of action that makes them the logical choice for your cars.

With car loadings steadily increasing, it is essential that all available freight equipment be ready for instant use. Equip them with the required type of National Friction Draft Gears and they will continue to give dependable trouble-free service for the life of the equipment.



NATIONAL M-50-B DRAFT GEAR
20⅛" long

NATIONAL MALLEABLE AND STEEL CASTINGS CO.
General Offices: CLEVELAND, OHIO
Sales Offices: New York, Philadelphia, Chicago, St. Louis, San Francisco.
Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.

Personal Mention

General

GEORGE R. WILLIAMS, road foreman of engines on the Union Pacific, has been promoted to fuel engineer, with headquarters at Omaha, Neb., succeeding G. H. Likert, who retired on June 1.

FRANK G. FOSTER, superintendent of shops, Canadian National at Leaside, Ont., has been appointed superintendent of motive power and car equipment of the Temiskaming & Northern Ontario, with headquarters at North Bay, Ont.

N. M. TRAPNELL, mechanical engineer of the Chesapeake & Ohio, has been appointed assistant to superintendent of motive power, with headquarters at Richmond, Va. The position of mechanical engineer, also the position of electrical and shop engineer formerly held by the late G. W. Bebout, have been abolished.

F. C. HOLTON, mechanical engineer of the Virginian at Princeton, W. Va., has been appointed assistant superintendent motive power, with the same headquarters. Mr. Holton was born on December 19, 1896, at Danville, Va., and was educated at Danville Military Institute, Danville, 1913; Virginian Polytechnic Institute, B.S., 1917; Cornell University, M.E., 1918. He entered railroad service on June 1, 1912, with the Southern as machinist apprentice at Danville and held a similar position on the Norfolk & Western at Roanoke, Va., during the summer months of 1913 to 1917. Mr. Holton served as machinist, test department, of the Norfolk & Western at Roanoke from June 1, 1919, to May 1, 1920, when he became mechanical inspector of the Virginian at Princeton. On January 1, 1924, he was appointed chief draftsman and on November 15, 1927, became mechanical engineer at Princeton.

JOHN WILHAM SASSER, superintendent of motive power of the Virginian at Princeton, W. Va., at his own request, has been relieved of the duties of that position and has been appointed consulting superintendent motive power, with headquarters at Norfolk, Va. Mr. Sasser was born on April 14, 1877, at Raleigh, N. C., and entered railroad service on December 5, 1892, with the Raleigh & Gaston and Raleigh & Augusta (now part of the Seaboard Air Line), as a machinist apprentice. In 1899 he went with the Atlantic Coast Line as a machinist, later becoming enginehouse foreman. In 1900 he returned to the Seaboard Air Line as a machinist at Raleigh, later becoming erecting shop and enginehouse foreman there. In November, 1901, he became enginehouse foreman of the Atlantic Coast Line at Rocky Mt., N. C., and later served as erecting shop foreman and enginehouse foreman before going to Raleigh as general foreman. In 1908 Mr. Sasser became master mechanic of the old Savannah, Americus & Montgomery, and on April 1, 1911, was appointed master mechanic of the Seaboard Air Line at Jacksonville, Fla. He was appointed superintendent motive power of the Norfolk Southern in 1913 and on December 31, 1920, went to Princeton, W. Va., as superintendent motive power of the Virginian. In January, 1938, his headquarters were transferred to Norfolk, and on June 1, because of ill health, he was appointed consulting superintendent motive power at Norfolk.

GEORGE THOMAS STRONG, who has been appointed superintendent motive power of the Virginian, with headquarters at Princeton, W. Va., as reported in the June issue of the *Railway Mechanical Engineer*, was born on December 22, 1883, at Clifton Forge, Va., and entered railroad service on January 8, 1902, with the Chesapeake & Ohio. After the completion of his apprenticeship he entered the service of the Norfolk & Western at Bluefield, W. Va., as a machinist, from which position he resigned on July 28, 1910, to go with the Virginian. Mr. Strong then served successively as machinist, erecting shop foreman, machine shop foreman, wheel and rod shop foreman, erecting shop foreman, and general foreman for the Virginian. From February 1, 1923, to May 31, 1936, he was master mechanic of the New River division of the Virginian, then becoming general master mechanic. On April 20, 1937, he was appointed assistant superintendent motive power.

Master Mechanics and Road Foremen

THOMAS R. ROSS, master mechanic of the Canadian National, at Leaside, Ont., has been retired from active service after 33 years with the road.

A. MACDONALD has been appointed master mechanic of the Hornepayne division of the Canadian National, with headquarters at Hornepayne, Ont., succeeding J. Hawkins.

J. HAWKINS has been transferred as master mechanic to the Allandale division of the Canadian National, with headquarters at Allandale, Ont., succeeding W. G. Strachan.

A. MILLER, assistant trainmaster of the Ft. Wayne division of the Pennsylvania has been advanced to trainmaster-road foreman of engines of the Toledo division, with headquarters at Toledo, Ohio.

H. SAMUELS, road foreman of engines, Chicago Terminal division of the Pennsylvania, has been appointed road foreman of engines of the Chicago Terminal and Logansport divisions, with headquarters at Chicago.

F. O. FERNSTROM, enginehouse foreman of the Chicago, Milwaukee, St. Paul & Pacific, at Milwaukee, Wis., has been appointed division master mechanic of the Hastings and Dakota division, with headquarters at Aberdeen, S. D., to replace A. M. Martinson.

J. D. SCOTT, road foreman of engines of the Logansport division of the Pennsylvania, has been promoted to trainmaster-road foreman of engines of the Grand Rapids division, with headquarters at Grand Rapids, Mich.

B. W. JOHNSON, assistant road foreman of engines of the New York Division of the Pennsylvania, has been appointed assistant road foreman of engines of the Baltimore Division, with headquarters at Washington, D. C.

A. M. MARTINSON, division master mechanic of the Hastings and Dakota division of the Chicago, Milwaukee, St. Paul & Pacific at Aberdeen, S. D., has been transferred to the La Crosse and River division, with headquarters at La Crosse, Wis., succeeding F. P. Miller, who retired on June 1.

JOSEPH P. BECKER, who has been appointed master mechanic of the Chicago Great Western at Oelwein, Iowa, as noted in the May issue of the *Railway Mechanical Engineer*, was born on December 5, 1888, at St. Paul, Minn. He attended the Oelwein public school and took a course in mechanical engineering at Iowa State College. He entered the service of the Chicago Great Western in June, 1906, becoming a machinist apprentice on August 1 of that year. He subsequently served as a machinist, draftsman, assistant machine shop foreman, gas engine foreman, efficiency engineer and apprentice instructor, production supervisor, and assistant mechanical engineer. He became general locomotive and boiler inspector on October 10, 1936, and master mechanic on May 1, 1938.

Car Department

CHARLES BATTLEY, air brake inspector of the Canadian National at North Bay, Ont., has been retired.

WILLIAM M. MACMILLAN, car foreman of the Canadian National at North Bay, Ont., has been retired.

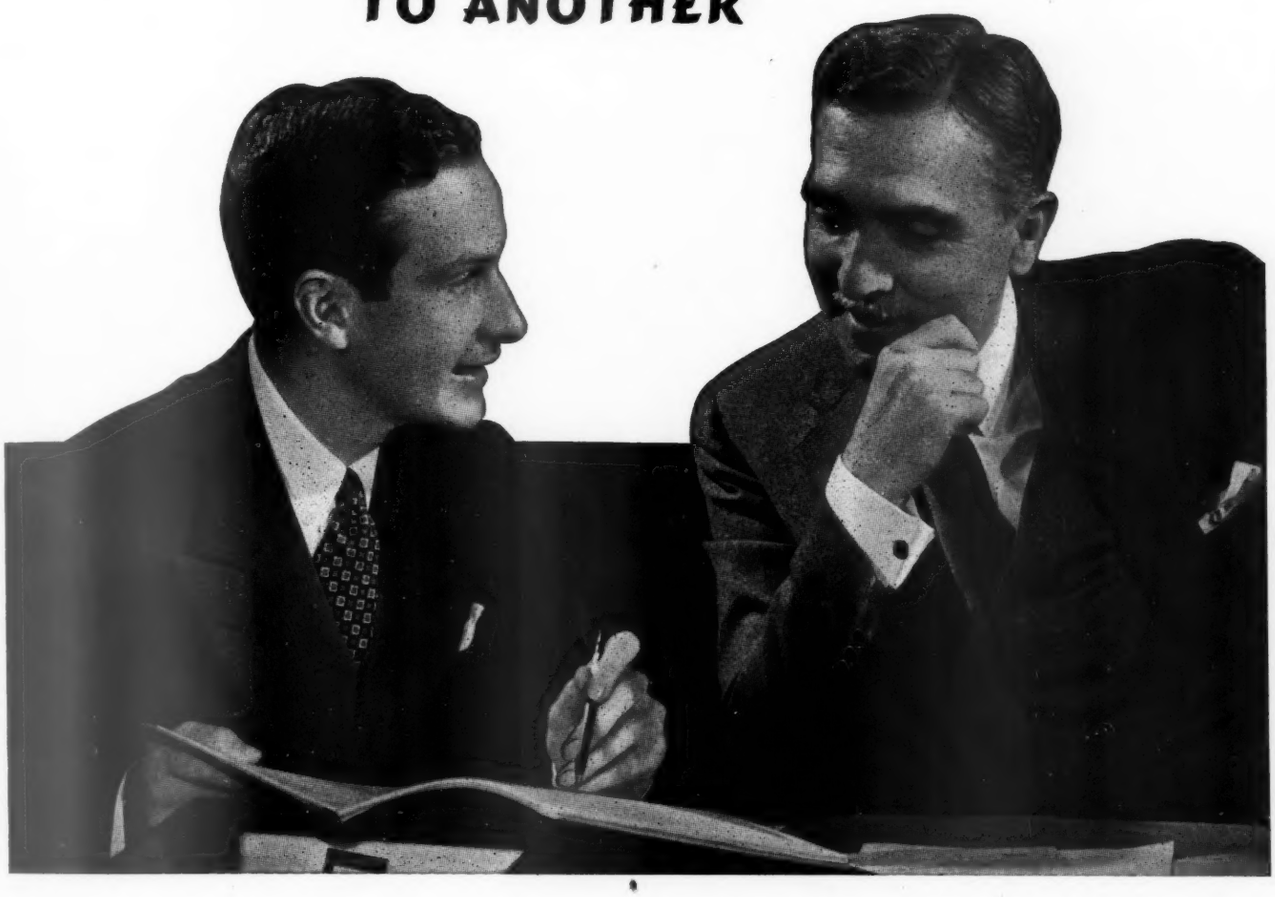
J. B. DUNLOP has been appointed superintendent car shop, Canadian National, with headquarters at Leaside, Ont., succeeding F. G. Foster.

M. E. FITZGERALD, general car inspector of the Chicago & Eastern Illinois at Chicago, has been promoted to the position of master car builder, succeeding to the duties of C. J. Wymer, superintendent of car department, who retired on July 1.

Mr. Fitzgerald was born at Boston, Mass., on March 5, 1886. He entered railroad service in 1901 in the car building and repair shops of the Merchants Dispatch Transportation Co., in East Rochester, N. Y., and subsequently worked as a car builder in the contract shop of the Pressed Steel Car Co., at Butler, Pa., the Standard Steel Car Co., at McKees Rock, Pa., and

(*Continued on next left-hand page*)

AS ONE SPECIALIST TO ANOTHER



YOU ARE a specialist in heavy machinery. You couldn't suddenly start to repair watches instead of railway equipment in your shop, any more than you could move a skilled lathe hand to the foundry and expect him to do expert work. You know *your job* and do it well.

Our job is cleaning. WYANDOTTE Technicians and Service Representatives have qualified as experts in metal cleaning through practical experience. And our products are designed the same way —to do a special job and do it well.

As one specialist to another, we invite you to bring your tough cleaning jobs to us. We have the products and we have the men who know they can be used efficiently and economically. Personal service is always available to you — without obligation, naturally.

THE J·B·FORD COMPANY
WYANDOTTE MICHIGAN
DISTRICT OFFICES IN 27 CITIES

the Pullman Car Co. at Chicago. In 1908 he went with the Gulf, Colorado & Santa Fe as a car repair man at Cleburne, Tex., and in 1909 became car foreman. In 1913 Mr. Fitzgerald left the G. C. & S. F. to

Martin E. Fitzgerald

go with the C. & E. I. as car foreman at Danville, Ill., and in 1914 was promoted to general car inspector.

Shop and Enginehouse

EMIL G. RINGBERG, mechanical engineer of the Boston & Maine, with headquarters at North Billerica, Mass., has been appointed superintendent of the road's repair shops at Concord, N. H., to succeed the late A. H. Anderson.

Purchasing and Stores

J. F. CLEMENTS, assistant purchasing agent of the Akron, Canton & Youngstown and the Northern Ohio, has been promoted to purchasing agent, succeeding Karl H. Suder. The position of assistant purchasing agent has been abolished.

M. W. FARRELL has been appointed division storekeeper of the Saratoga and Champlain divisions of the Delaware & Hudson, with headquarters at Colonie, N. Y., succeeding O. J. Lapaugh, who has been assigned to other duties.

C. I. CASWELL, division storekeeper of the Delaware & Hudson at Plattsburg, N. Y., has been appointed assistant division storekeeper, Saratoga and Champlain divisions, with headquarters at Colonie. The office of division storekeeper, Champlain division, has been abolished.

WARREN W. KELLY, chief engineer of the Western lines of the Atchison, Topeka & Santa Fe, at Amarillo, Tex., has been promoted, effective July 1, to general purchasing agent of the Santa Fe system, with headquarters in Chicago, succeeding J. J. Conn, who died on April 28.

Obituary

CHARLES PETERSON, master mechanic of the Denver & Salt Lake, with headquarters at Denver, Colo., died on June 29, following an operation.

ARCHIBALD M. WATT, former master mechanic of the British Columbia division of the Canadian National, with headquarters at Prince George, B. C., died on May 25. Mr. Watt was 65 years old and had retired about a year ago after 46 years of service.

J. T. CONNOR, who retired as superintendent of the Texas & New Orleans shops at Houston, Tex., in February, 1932, died at his home in Ennis, Tex., on May 30. Mr. Connor was born in Houston on December 17, 1865. At the age of 14 he became a machinist apprentice in the employ of the Houston & Texas Central which has since been merged into the present Southern Pacific system. He subsequently served as a machinist, enginehouse foreman, general shop foreman, assistant superintendent of motive power, superintendent of motive power and machinery, and assistant general manager of motive power and car departments. He was appointed shop superintendent at Houston in 1927.

M. B. MCPARTLAND, general superintendent of motive power of the Chicago, Rock Island & Pacific, with headquarters at Chicago, died suddenly at St. Louis on June 10. Mr. McPartland was born at Burlington, Iowa, on October 3, 1882, and graduated from Purdue University in 1905. He began railway service as a special apprentice on the Chicago, Burlington & Quincy in 1905; and in 1907, went with the New York Central as gang foreman in the West Albany, N. Y., shops. Two years later he became a draftsman on the Rock Island, and in 1910 he went with the National Railways of Mexico as mechanical engineer, returning to the Rock Island in 1913 as general foreman in the mechanical department at Cedar Rapids, Iowa.

M. B. McPartland

Two years later he was transferred to the 47th street shops, Chicago, and after a short time in this position he was promoted to the position of master mechanic at Goodland, Kan. In 1917 Mr. McPartland left the Rock Island to become master mechanic of the Denver & Salt Lake, later being promoted to superintendent of motive power of that road. In 1921 he became superintendent of motive power of the Western Pacific, returning to the Rock Island on June 15, 1936, as general superintendent of motive power.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers. State the name and number of the bulletin or catalog desired, when mentioned in the description.

WELDERS. — Hobart Brothers, Hobart Square, Troy, Ohio. Bulletin illustrates new model Multi-Range dual control arc welders.

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FORGING PRESS.—The Ajax Mfg. Co., Euclid P. O., Cleveland, Ohio. Bulletin 75; 4-page leaflet. Illustrates and describes 1,000-ton solid frame forging press.

◆

RADIAL THRUST ROLLER BEARINGS.—Shafer Bearing Corporation, 35 E. Wacker Drive, Chicago. 74-page catalog. Radial thrust roller bearings and self-aligning ball- and roller-bearing units for industrial and machine applications. Engineering data.

◆

VALVES.—Gold Car Heating & Lighting Co., 220 Thirty-sixth street, Brooklyn, N. Y. Bulletin No. 10. Introducing new pressure reducing and regulating valves, starting valves, and end train pipe valves in the larger sizes for railway, marine and industrial service.

◆

PIPE TOOLS.—Beaver Pipe Tools, Inc., 310 Dana street, Warren, Ohio. Eight-page bulletin descriptive of a new (Model B) ⅛-in. to 2-in. pipe and bolt machine which may be purchased complete or in units. Also a four-page price list of Beaver pipe tools.

◆

BLUEPRINT PAPERS.—Keuffel & Esser Co., Hoboken, N. J. 11-page booklet, "Series Sixty Blueprint Papers." Papers described have an unusually deep blue color and an extremely wide printing range, and produce blueprints said to be as easy to read as the original drawings. List prices.

◆

VALVES, FITTINGS, TOOLS.—Walworth Company, Inc., 60 East 42nd street, New York. Catalog 89; 602 pages; illustrated. Lists and describes complete line of Walworth valves, fittings, pipe and tools, with sections on A. A. R. bronze globe and angle valves; and A. A. R. malleable iron fittings, and A. A. R. unions and union fittings. Engineering data.

◆

ELECTRODES.—Page Steel and Wire Division of American Chain & Cable Co., Inc., Monessen, Pa. Twelve-page bulletin. Describes and illustrates the Page-Hi-Tensile G electrode for flat and positioned fillet and general flat welding. Suitable for use with either motor generator or transformer type machines.